DECEMBER, 1940

# Railway Engineering and Maintenance


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They work continuously—absorbing shocks, equalizing bolt tension, insuring resilient joints.

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THE NATIONAL LOCK WASHER COMPANY
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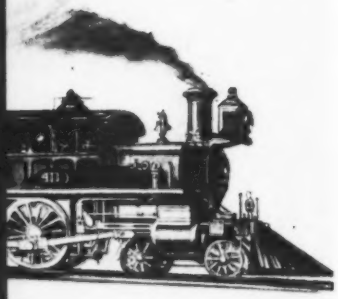
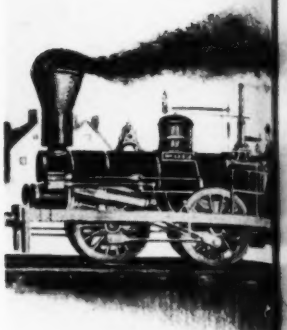
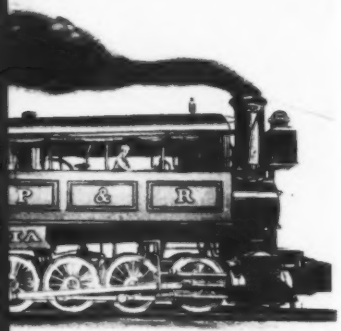
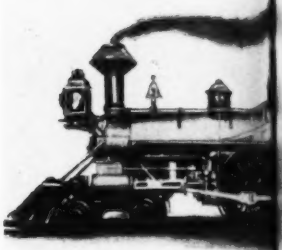




HY-CROME POWER SPRING





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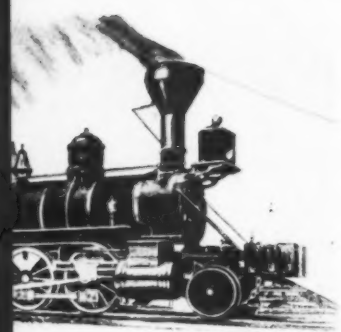

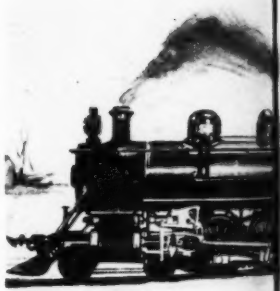

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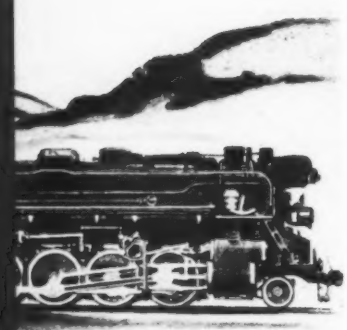

EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON, OHIO

*Sales Offices:* New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

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## WINTER KING SWITCH HEATERS

Now's the time to prevent switches freezing up or being blocked by snow or sleet this winter. Now's the time to install Winter King Switch Heaters.

Winter Kings are designed to make installation and maintenance easy and economical. They are completely self-contained and, because they are kerosene-burning, can be used where electricity, gas or steam are not readily available.

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**BETHLEHEM STEEL COMPANY**


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## They do a BETTER JOB *Quicker*

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**Each Unit is Self-Contained and Easily Carried by ONE MAN**
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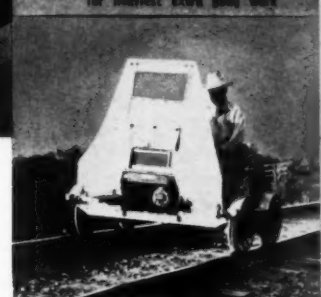
# CARS THAT CARRY NO COAL

## *Help Keep Gondolas Moving on Schedule*

FAIRMONT M9 SERIES C, 1 to 2 man

FAIRMONT M8 SERIES C car in

FAIRMONT A6 SERIES C, 8



FAIRMONT M10 SERIES B in

FAIRMONT M14 SERIES B

FAIRMONT S2 SERIES E

FROM tipple to market, coal for America's foundries, blast furnaces, and heating plants, goes swiftly by rail. Helping to insure uninterrupted flow of this "life blood" of industry, are thousands of cars that carry no coal. They are the inspection cars, section cars, and gang cars that regularly travel the right of way in the service of men responsible for maintaining a clear track. Without these "helpers," the big gondolas could not get through on schedule. In all kinds of weather, the men who ride these maintenance-of-way cars are constantly on the alert inspecting signals, track and bridges and making necessary repairs. To meet the diversified requirements of these men, Fairmont has developed the world's most complete line of railway motor cars —a line that has been famous for its dependability and economy for more than 30 years. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

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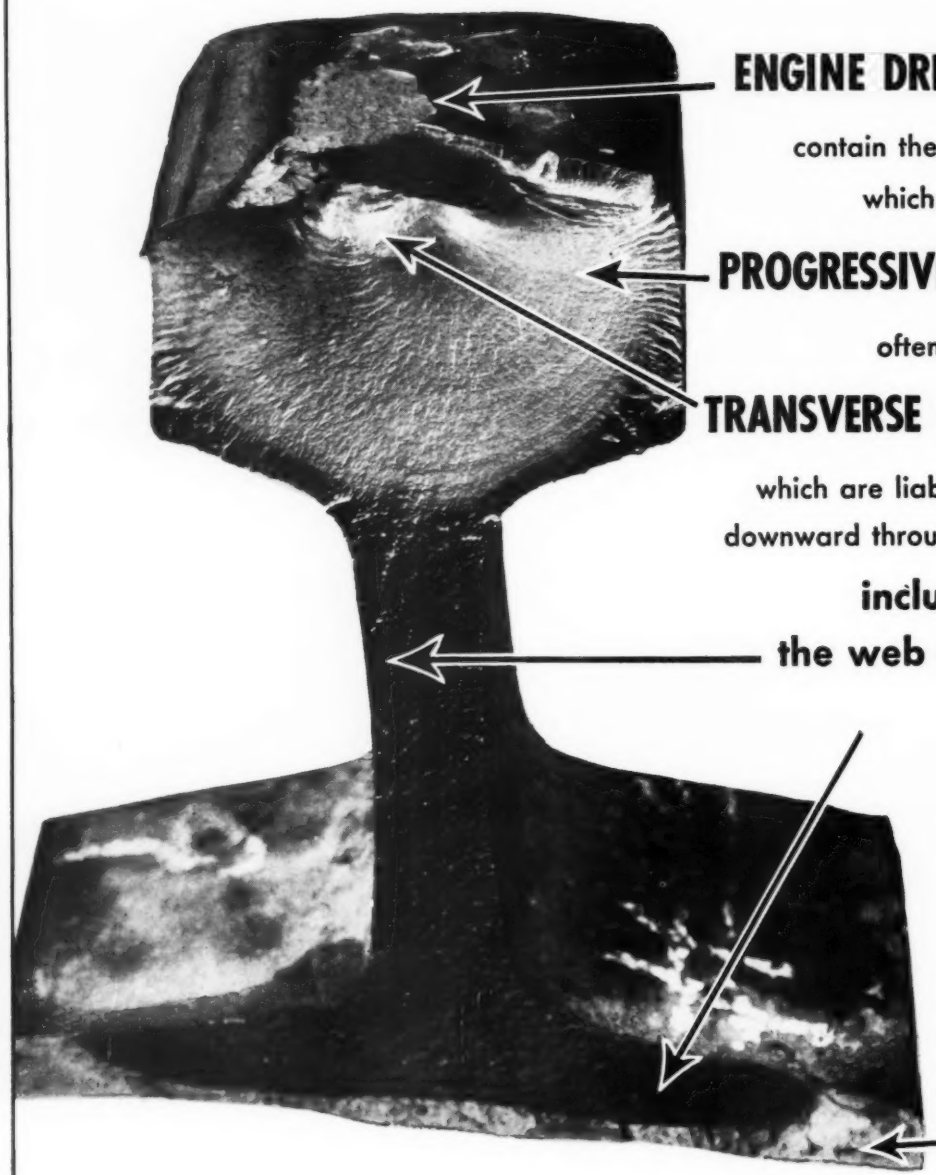
FAIRMONT S2 SERIES E. 1 to 8 men. 1,800 lb. load capacity. Fairmont QBA Ball Bearing 8 to 13 H.P. engine.

*Performance* ON THE JOB COUNTS

# Driver Burns Are a Hazard



**ENGINE DRIVER BURNS**

contain thermal cracks

which cause

**PROGRESSIVE FRACTURES**

often with

**TRANSVERSE COMPONENTS**

which are liable to progress downward through the entire rail

**including the web and base**

resulting in

**complete failure in service**

(In this case, only the lower portion of base remained intact.)

- **Prior to 1940, Progressive Fractures under Burns were undetectable.**

- **NOW, with Sperry's latest equipment, Progressive Fractures under Burns can be detected.**

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No tools needed for this simple positive chuck!

# Greater Speed and More Convenience When Drilling Rail

The unique chuck for holding flat bits consists of only two half-cylindrical pieces of hardened steel. It is automatically and positively gripped in the spindle. No tools are needed for tightening. There are no threads to strip. It can be removed with the tap of a hammer.

## *Other Nordberg Tools*

In addition to this machine for drilling rail, Nordberg Tools are available for such jobs as pulling spikes, adzing ties, tightening bolts, grinding rail, and raising and shifting track for ballasting and construction projects.

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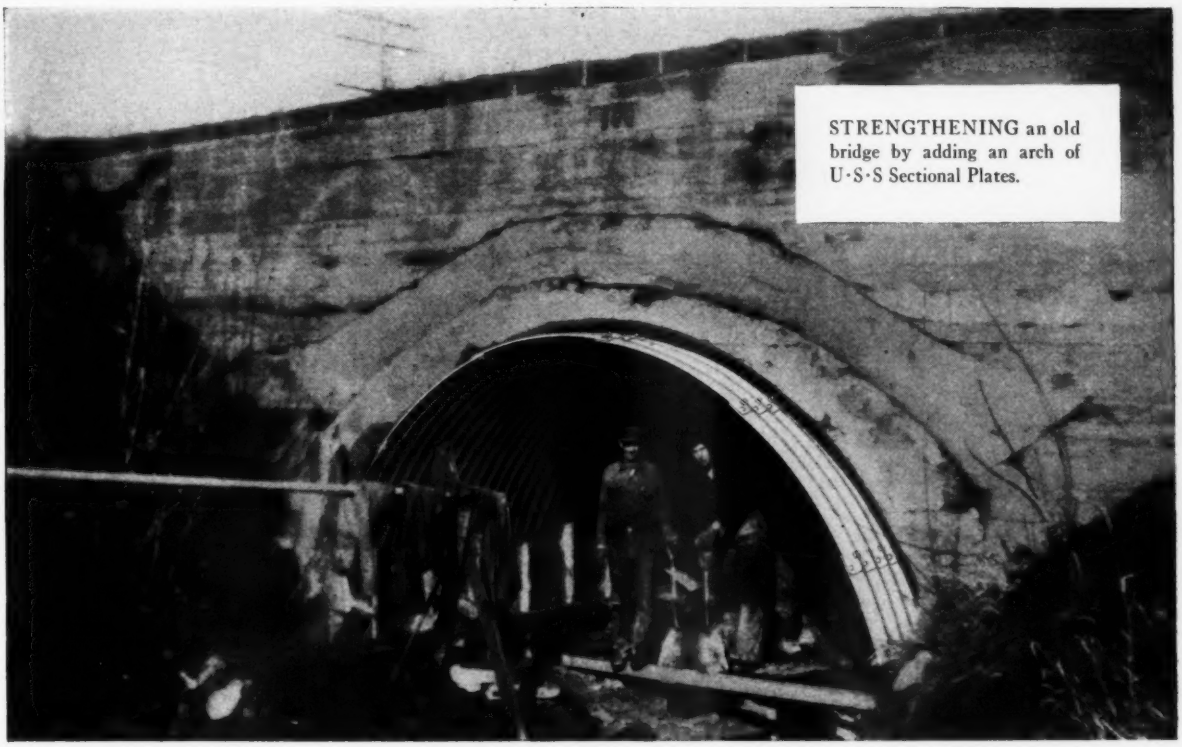
# "Old-age Security"

## *FOR SMALL BRIDGES*



STRENGTHENING an old bridge by adding an arch of U·S·S Sectional Plates.

## *U·S·S Sectional Plates add new strength and rigidity*

THEY put new life into this old bridge when they gave it a backbone of U·S·S Steel Sectional Plates. Constant pounding of heavy traffic had weakened the structure until it was necessary to replace the bridge or do a first-class repair job.

A U·S·S Steel Sectional Arch solved the problem. It was easily bolted into place under the old arch and the intervening space pumped full of concrete. Now the bridge has the necessary strength and resistance to vibration to assure many more years of useful life. The cost was small compared to that of a new bridge.

U·S·S Sectional Plates have many advantages. They simplify construction of new bridges, are easy to put together with ordinary labor, last a lifetime, decrease construction costs. The base metal is durable U·S·S Copper Steel with a heavy coating of galvanizing for added protection against corrosion. Sectional plates made from pure iron can also be supplied.

Highly satisfactory results have been obtained with U·S·S Sectional Plates for culverts, safety underpasses, for enclosing small streams and similar uses. Investigate this new way to reduce maintenance.

**SECTIONAL PLATES**

*Look for this trade-mark on steel products. It is your assurance of quality and full value for your money.*

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**UNITED STATES STEEL**

No. 144 of a series


# Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.


December 1, 1940

**Subject:** Saving Your Time

Dear Reader:

As you read Railway Engineering and Maintenance from month to month, I wonder if you have ever thought how much time it saves you in selecting the materials and equipment you need to carry on your work. Suppose no such paper were available to bring these new developments to your attention, and you had to depend on occasional contacts with other maintenance men and on calls by salesmen.

Perhaps those of you who are located in the larger centers and carry system supervisory responsibility might conclude at first thought that you would lose little for the salesmen would seek you; this is possibly true but as the number of salesmen and calls increased, the inroads on your time would rise correspondingly. For those of you who are located at division headquarters and other outlying points, the loss would increase in proportion to the remoteness of your location.

However, regardless of your location, I am sure that reflection will convince you of the economy in time that accrues to you by reason of your use of your magazine. The information in its advertising pages enables you to study a product at your convenience; you can refresh your memory regarding it at will; and it reminds you where you can secure further and more detailed information when your need arises. In these ways it conserves your time; it also conserves and makes more effective the time of the salesman who calls on you.

This attribute of a business paper is particularly valuable in days such as these when expanding programs are bringing you face to face with new problems, with their requirements for materials and equipment outside your recent experience. Under such conditions, your business paper becomes the first source of reference. It is our purpose that Railway Engineering and Maintenance shall serve you adequately in reader and advertising pages alike in the more active days that appear to be ahead. We hope that you may find this objective reached reasonably well.

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor


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*Timber*

# IS MAKING ENGINEERING HISTORY

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The connector system has revised traditional formulas for designing in timber . . . changed it from a carpentry to an enginering material and stimulated the establishment of widespread new capacity for shop fabrication.

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nearly 30,000 new structures—hangars, bridges, trestles, dry docks, barracks, trusses, towers and oil derricks—have saved money by employing low-cost TECO-equipped lumber construction?

HAVE YOU FULL, DETAILED INFORMATION ON THE TECO CONNECTOR SYSTEM? WRITE TODAY. USE THE COUPON BELOW.

*Timber* ENGINEERING COMPANY INC.

Dept. F-12, 1337 Connecticut Avenue

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Please send us full technical information on the new design opportunities in timber made possible through the development of the Teco Connector system.

Individual .....
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Street .....
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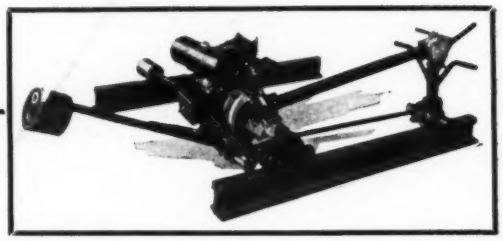
# Accurate



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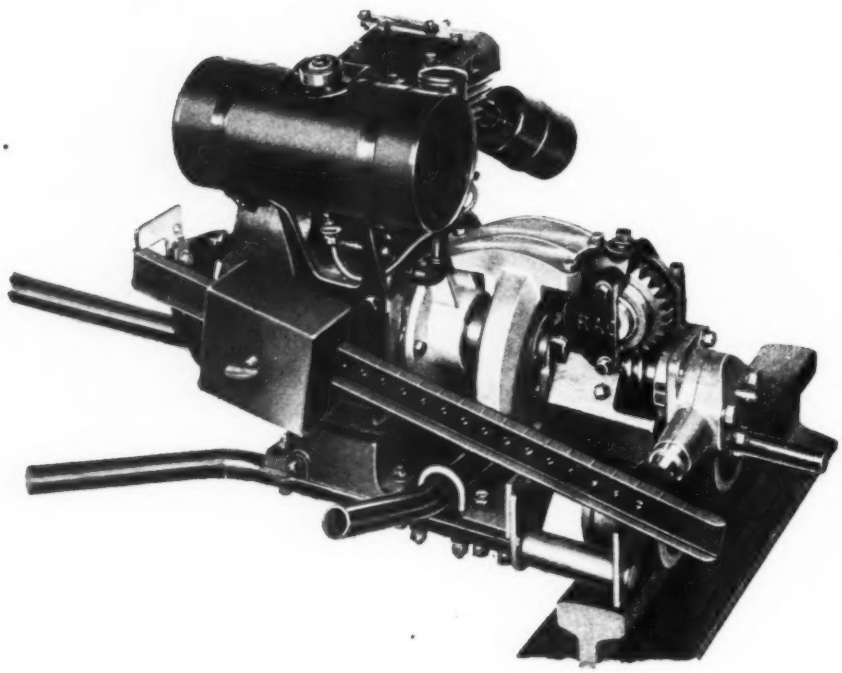
# The new *Raco Micro Cutout*



is remarkable also for its **smoothness of operation,** as well as its precision.

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# Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

DECEMBER, 1940

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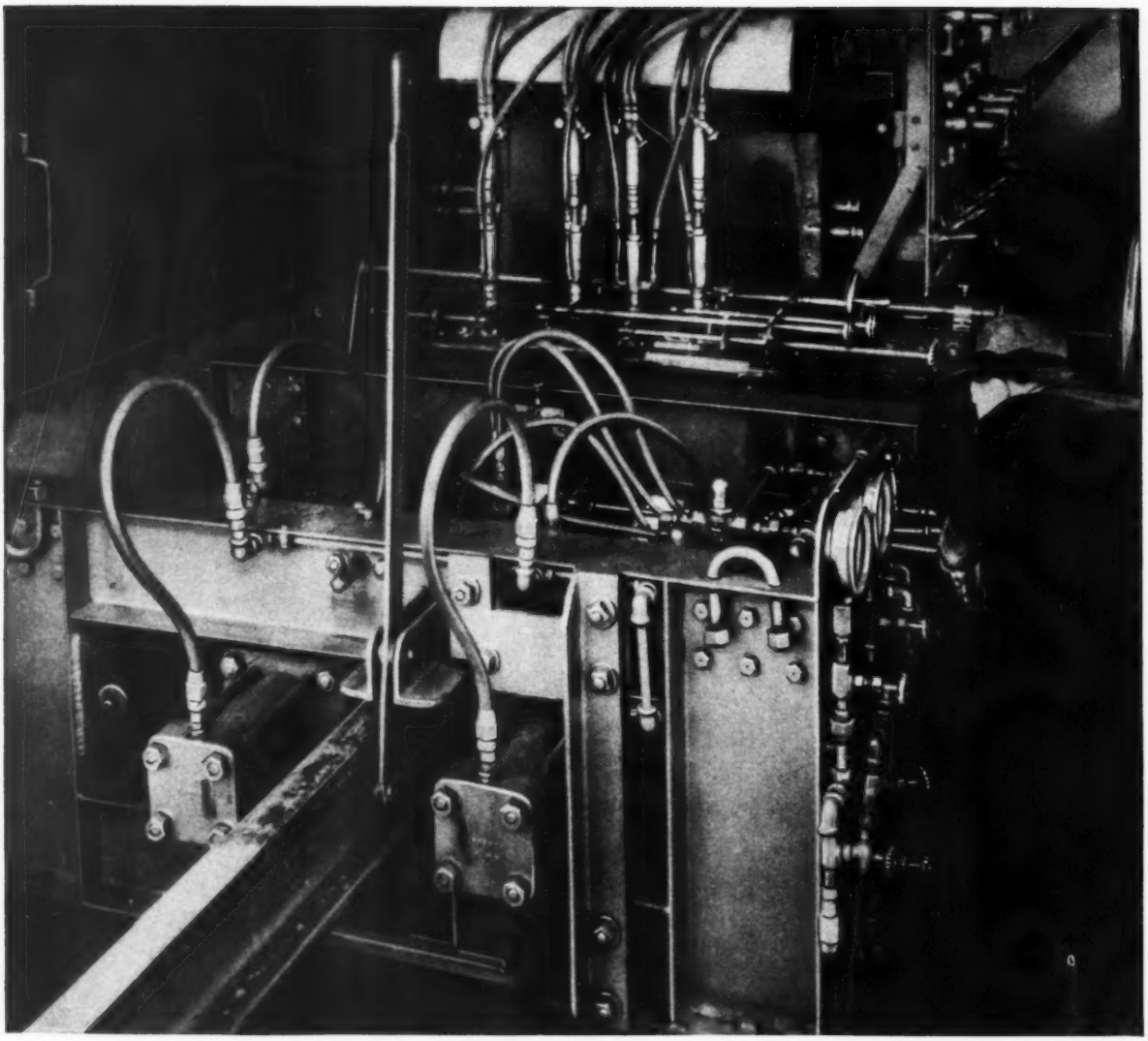

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# OXY-ACETYLENE BUTT-WELDED RAIL

● Butt-welded rail installed on open deck bridges greatly reduces impact. Used in road crossings and station platforms, it avoids tearing up pavement to repair rail joints. Butt-welded rail also materially lowers maintenance expense in tunnels and other installations. The Oxweld pressure butt-welding method is the result of extensive laboratory development. This method, and the oxy-acetylene equipment shown above which is used to apply it, are assisting railroads to reduce costs.

THE OXWELD RAILROAD SERVICE COMPANY
*Unit of Union Carbide and Carbon Corporation*
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OXWELD RAILROAD SERVICE

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

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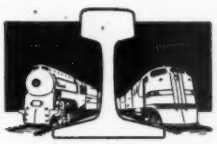
Railway Engineering and Maintenance



# Passenger Progress

## A Remarkable Record of Achievement

TO tell anyone in our day that this is an age of revolutionary change is merely to give expression to the obvious. We see it all about us. We see candidates for high political offices carrying their arguments to the people seated about their firesides. We are informed of developments on the battle fronts of Europe almost hour by hour. Everywhere is change—and underlying it all is a rapidity of action that was unthought of as recently as a generation ago.

Everywhere this change is being acclaimed as an evidence of progress—of elevation to a higher level of development. We marvel at its ramifications in other industries. Yet nowhere is it more in evidence than in the industry of which we are a part—the railway industry.

Because of our intimate day-to-day participation in this transformation, we are prone to overlook its magnitude, its appeal to the public, its contribution to the welfare of our country, socially as well as industrially, and its ramifications within the railroad industry itself. It is a story that thrills the public when brought to its attention, that warrants emphasis and repetition. It is one that every railway employee should broadcast.

This transformation is revealed most dramatically in the revolution that is taking place in passenger service. It is typified by the streamlined passenger train, the public appeal of which has carried this term into a wide variety of channels so remote from transportation that today the term streamlined is a synonym for progress.

### In Only Six Years

The streamlined train is a development of the present decade. The first train of this type was placed in regular service as recently as November, 1934. Only six years have intervened since this first train — a three-coach train—began operation between terminals less than 300 miles apart. Yet today 100 of these lightweight streamlined trains are now operating more than 50,000 miles a day—and 26 more trains are now being built for early delivery. In the 15 months since September 1, 1939, 32 of these trains have been placed in operation, demonstrating the rapidity with which this development is taking place at the present time.

For illustration, the Burlington, starting with one small train in November, 1934, is now operating a fleet of 14 of these trains, some of which run up to 17 cars at times; 3 of these trains were placed in service during the last year. These trains are operating 8,441 train miles daily and have already traveled more than 10,000,000 miles on this one road.

Similarly, the Santa Fe, although starting somewhat later, is now operating 16 of these new trains and the Rock Island will have 15 trains in operation when 3 trains now on order are delivered in the near future. The Union Pacific, the Chicago & North Western, the Southern Pacific, the Southern, the Seaboard Air Line, the Atlantic Coast Line and other roads are also contributing to this development through the operation of new and modern trains over their lines.

### A Remarkable Expansion

From a small beginning with a three-car train of limited dimensions, these trains have grown to 10 and 12 cars of standard dimensions on several roads, and the North Western-Union Pacific are now operating a 17-car train in Chicago-Los Angeles service and, jointly with the Southern Pacific, will soon place an 18-car train in service between Chicago and San Francisco. Demonstrating the versatility of this service, several roads have also built one and two-car units for local service this year.

These trains are now serving almost all parts of the country from Bangor, Me., to Miami, Fla.; from New York City to San Francisco, Cal., and Los Angeles; from Minneapolis, Minn., to the Gulf of Mexico. Within the last year these services have been extended between such points as Denver, Colo., and Dallas, Tex.; between Kansas City, Mo., and New Orleans, La.; and between Des Moines, Iowa, and Colorado Springs-Denver, Colo., while similar service will be inaugurated over three routes between Chicago and Florida in December.

### Rebuilt Trains and Coaches Too

And the improvements in passenger service have not been confined to the newly built trains, for a number of roads have rebuilt and are operating trains that closely approach, if they do not equal, those newly built in luxuries of appointments. Included among such trains are the Royal Blue of the Baltimore & Ohio, the Challengers of the Chicago & North Western-Union Pacific-Southern Pacific, the Mercury and the Pacemaker of the

New York Central, the Trail Blazer of the Pennsylvania, the John Wilkes, the Asa Packer and the Black Diamond of the Lehigh Valley, and the Firefly of the Frisco. Operating on schedules comparable with the streamliners, nearly 40 of these trains are now supplementing those newly built.

And the improvement is not confined to these trains, for coaches and sleepers of the same designs as those included in the "flagships" are now operating in common with standard equipment in other trains. Thus, the Pullman Company now has more than 400 sleeping cars of modern lightweight design in service in new and standard trains, while several times this number of coaches, with roomy bucket-type seats, modern decoration and lighting, large windows, modern lavatories, etc., are in service. Air-conditioning, probably the greatest single improvement of all, is now found in more than 12,000 sleeping cars and coaches, with the result that practically all assigned cars in through service are air-conditioned.

### Merchandising Principles Adopted

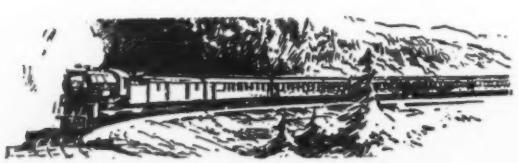
And the improvements designed to attract passenger traffic are not being confined to trains. Stations, the gateways to the trains, are also being "streamlined" in arrangement, decoration and furnishings. Uptown ticket offices in the larger centers are being re-designed to attract and to serve discriminating travelers, making the negotiation for a trip one of genuine pleasure. And proven methods of merchandising are being extended to the sale of railway transportation through the adoption of such measures as the "travel on credit" plan, while the competition of the private automobile is being met by the perfection of means whereby the railway traveler may have an automobile available for him at his destination.

This is the service that is now being offered the traveler by the railways, a service so superior to that of a decade ago as to make comparison difficult. How is it being received by the public? The best answer is to examine the effect on travel. Such a study shows a surprising reception by the public—a reception that survives the initial introductory period and continues indefinitely. It is a common experience that these new trains continue to show steady gains month after month, some of them exceeding $3 per train mile in gross earnings, after even three and four years of operation.

### A Transition to Be Proud of

This is the revolution in service that is being offered by the railways. It is a revolution that is equalled in few other industries. No stronger evidence should be needed to demonstrate the courage and initiative of railway management. It is an improvement that is received with remarkable favor by the public, as shown by their patronage.

The best advertisement of this new service is the steadily increasing number of pleased patrons. The next most valuable booster is the enthusiastic employee. He can do much to further the knowledge and use of these trains by telling the story of their progress with the enthusiasm that it warrants—a story that is truly one of the epics in transportation history.



# Tie Renewals

## Progress Being Made in Mechanical Aids

TRACK maintenance men are awaiting further developments and refinements in mechanical aids for tie renewal work, with the unusually large savings which such aids promise. That this is true is seen in the remarks of maintenance officers whenever they discuss the problems of tie renewals—furthermore, it is evident that many of these men, pressed for greater economics in this costly item of maintenance of way work, await these further developments with some degree of impatience.

That this latter situation prevails is indicated in a statement made recently by the chief maintenance officer of a large road, who, while recognizing the efforts that have been made during the last eight or ten years to develop a tie puller, indicated that the ultimate in such a device is far from being reached as yet, stating that while some of the devices now available operate more efficiently than others, they all have one defect in common in that their use does not greatly reduce the cost of renewing ties, if at all. Commenting upon this statement, another maintenance officer has said that he doubts that we will ever be able to get a machine to assist in tie insertion work that will show an actual saving, compared with hand labor.

The men who made these statements, like many other maintenance men, have worked patiently with a number of manufacturers over a span of years in efforts to develop suitable mechanical aids for tie renewal work, and it is known only too well that their hopes in certain devices have been shattered repeatedly by unsatisfactory service tests, and often, also by high first cost. As a result of these experiences, it is possible that the foregoing comments reflect discouragement. Yet, such statements may be intended as a challenge to manufacturers and railway men alike, to speed further development.

That progress in the development of such equipment has been slow compared with that for certain other classes of maintenance of way work, must be conceded, but that progress has been made during at least the last two or three years is attested by the favorable performance records of certain units of this equipment which have appeared in the editorial and advertising pages of this publication during this period. Further evidence in this regard is contained in reference to one such unit of equipment in this issue.

It is not contended that perfection has been reached in mechanical aids for tie renewal work from the standpoints of low first cost, the greatest adaptability to the varied conditions encountered in the field, maximum production and greatest overall efficiency, but it is contended that progress has been made, and that when these units can demonstrate overall savings of as much as 30 per cent or more in tie renewal costs, as certain of them

are reported to have done under specific conditions, maintenance men are running the risk of overlooking sizable economies by holding back for the ultimate. Even in their present stage of development, if the figures have been interpreted correctly, some of the units now available appear to be paying for themselves in less than one season, and, in addition, to offer important advantages in less disturbance of the roadbed. If this is true, those maintenance men who have given them little or no consideration are paying for this equipment through their more costly pick and shovel methods without getting the equipment, and, at the same time, are depriving themselves of the improved roadbed possible through their use.

# Rip Rap Protection—

## Many Improvements in an Old Practice

A railway maintenance officer located in a territory traversed by numerous streams and rivers subject to violent floods with almost every severe general storm, especially in the spring of the year, said recently that he had found that the promiscuous dumping of rip rap for bank protection along one of these streams without anchoring it in position had proved no more effective than dropping a filling in a cavity in a tooth. He cited one example after another of rip rap that had been undermined during floods, causing long sections of embankment facing to slide into the stream and leave the embankment itself unprotected.

While the conditions to which this officer referred are unusually severe, the experience with floods in the United States during the last five or six years shows conclusively that this problem is widespread and likely to confront maintenance men in almost any part of the country. This being true, it is pertinent to question whether the greatest effectiveness is being secured from rip rap as commonly placed in the past.

The use of rip rap to prevent or minimize bank wash in streams is as old as the railroads themselves, and in thousands of cases it has proved an effective barrier against stream scour. However, in spite of many examples that might be cited to the contrary, it may well be questioned, in the light of improved practices in recent years on at least a few roads, whether rip rap protection generally has been given the thought that it warrants, and whether it has been used most effectively. To many men engaged in roadway maintenance in the past, any rock dumped as a protecting blanket has constituted rip rap and if any special consideration was given to it, it had to do largely with the size of the individual pieces and the thickness of the protecting course. If this rock was washed out, as occurred on many occasions, more and larger rock was the remedy usually resorted to.

No one questions that a rip rap course can be made sufficiently thick and heavy to afford protection against bank wash under almost any condition of stream flow, but, recognizing that rip rap protection of any kind involves costs which are not inconsequential, one may question whether the size of the individual pieces and the quantity dumped are the only factors that should be taken into consideration. On many of the larger projects that have been undertaken in recent years, the character of the rock to be used has also been an important factor to secure a rock that is not only durable, but which has maximum density and weight. Obviously, such rock affords greater resistance to disintegration and will not be displaced as readily under flood flow conditions.

And of still larger importance, several roads have been securely anchoring the toes of rip rap blankets or otherwise preventing their undermining. This anchoring has usually taken the form of extending the rip rap face down into the stream bed below possible scour, carrying out extensive excavation and backfilling operations to this end where necessary, or of keeping the toe of the blanket in place by some form of dike or jetty, not infrequently consisting of a line of scrap rails driven deeply into the stream bed and tied together by lines of cables or horizontal rails. In still other cases, the lower courses of rock have been grouted to form a monolithic mass.

Where these later methods in rip rap blanket protection have been subjected to severe test, they have demonstrated their superiority over the loose rock veneer of nondescript stone which some still think of as rip rap construction. Those who are confronted with bank protection problems will find it worth their while to investigate these developments.

# Removing Snow

## There Appears to Be a Place for Trucks

ELSEWHERE in this issue an article, prepared early in November, describes the plans developed in the Twin Cities terminals of the Chicago, Milwaukee, St. Paul & Pacific for fighting snow, in which extensive use is made of rented highway motor trucks in place of snow trains, a practice which has been used effectively and with large economy during the last four winters. It is fortunate that these terminals were prepared for winter conditions early in November, because a storm on November 11 and 12 buried them under more than 16 in. of snow, with many drifts as high as 5 and 6 ft.

It was a record storm for this season of the year in this territory, completely tying up street, highway and air traffic and disrupting train schedules. In fact, it was more severe than the peak storms of many winters. But the Milwaukee's snow-fighting organization was ready for it. Fleets of manned motor trucks arrived at the central dispatching point within a few minutes after they were called. Altogether, twenty-three 2 to 4½-yd. self-dumping trucks were employed, more than had been used on any previous occasion. With crews of 15 to 20 men each, they were dispatched first to one place and then to another as conditions dictated, moving about with flexibility and dispatch that could not have been equaled by snow trains under even less severe conditions.

It was a sudden and severe test of this snow-fighting plan, but the plan worked, and those who saw it in operation are more convinced than ever that the motor trucks used played a most important part, and with large economies over snow-train methods. With this example before them so early in the present winter season, it is possible that the maintenance officers of other railways, with similar conditions, may find valuable suggestions in the plan employed so effectively at the Twin Cities.

Cost Analysis is Readily Applied to Extra Gangs Because Their Work Usually Involves a Limited Number of Operations

# Section or E

**This article was prepared by a maintenance officer who prefers to remain anonymous. It is not an attempt to show that either the section gang or the extra gang is superior or preferable for any type of work; it is a plea for the adoption of methods that will make it easy for maintenance officers to determine the output per man-hour for both section and extra gangs, and thus enable them to analyze their operations and know the relative economy of the two organizations, as well as to compare the relative effectiveness of their section gangs**

AN arresting editorial appeared in the April issue of *Railway Engineering and Maintenance* under the title, Section or Extra Gangs, Which Are the Most Effective Today?, which furnishes much food for thought. As was pointed out in the editorial, "few subjects have been more prolific of discussion in recent years than that of the relative advantages of section and extra gangs for routine maintenance tasks, particularly with respect to renewing ties and general surfacing which does not require the application of ballast, except so far as this may be necessary to fill out the ballast section."

In the third paragraph of this editorial it is stated that "the cold logic of the demand for greater economy in maintenance cannot be met by opinions unless they are supported by facts that prove them to be fundamentally correct." The editorial ends with the further comment that "preconceived ideas have no place in today's maintenance programs unless they have been subjected to searching analysis and it can be proved that they can survive on the basis of merit and are not based merely on preference or custom."

These three statements, which stand out in such bold relief, together with the remainder of the editorial as a background, call attention to a situation that stands sadly in need of correction. That this need exists is becoming increasingly apparent, for despite the prolific discussion that has been mentioned and with which alert maintenance officers are familiar, and despite the contributions to this discussion that have been made by such officers from every section of the country, who are working under a great variety of conditions, we go on disagreeing about the most elementary steps that can be taken to correct the situation, in much the same way as we did when maintenance work was admittedly a hit-and-miss process that was carried on by purely trial-and-error methods.

## Question Not Answered

This failure to agree on even the simplest and most fundamental rules for investigating the operations of these gangs and comparing the results leaves the question that forms the basis of this article unanswered and the problem of relative economy unsolved. As long as the matter remains in the discussion stage it is useless to expect or even hope for a solution for, as the editorial says, "Neither side seems to be deeply impressed by the arguments of the other." Yet the need is very great to obtain and use a workable solution, that is, a formula that will permit one to make a dependable comparison of the output of section and extra gangs when working under both comparable and dissimilar conditions.

Casual observation of the work of a small, or even a large, section gang gives no basis for comparison with that of a large extra gang that is organized on the basis of mass production. On the other hand, it is obvious that the total amount of work performed by each of these gangs can be compared, provided they are engaged in the same kind of work. In the same way, the total cost of the two jobs can be compared, but for the purposes under discussion either or both of these items is completely useless. What is needed is a comparison of the unit cost for each gang, and this cannot be obtained from totals, as they are now given.

It is difficult to conceive that any experienced maintenance officer does not know of one or more comparatively simple ways to tabulate and analyze the work of these gangs, down to the smallest detail. Yet one is forced to conclude reluctantly that many experienced, alert and otherwise capable officers have little, if any, practical knowledge of the actual or potential work output of scheduled section forces.

## Ignorance Is Confirmed

That this ignorance actually exists can be confirmed easily by reading articles and committee reports on maintenance subjects, not a few of which contain unmistakable evidence of it. Some of those who have written on the subject have dealt with it in general terms only, and others have

# Extra Gang?

## Only Careful Analysis Will Tell

offered narratives describing one or another method that is being followed in the employment of the section forces. Despite the fact that these methods may differ widely, each one insists that the method he has described has been found by experience to be the best.

In private conversations it is not uncommon for these officers, and others who have not written on the subject, to intimate, or even say directly, that it is not necessary to analyze the details of gang operations to know which form of organization demonstrates the greater economy. They take the position that if general principles are followed, the details will take care of themselves. Others say directly, and sometimes emphatically, that they know from an experience of 20 to 50 years in maintenance work that a certain method is best. None of these writers or speakers appears to know how many man-hours are required to do certain individual jobs or certain units of work, or whether a section gang will require more or less man-hours than an extra gang to complete a given number of units of work.

One who has studied the matter thoroughly can scarcely escape the conviction that we must know this man-hour value in all cases before we are in position to compare the work output of the gangs. Even when this information is available, one must have had sufficient experience to enable him to interpret the values as they are given. Obviously, he must be able to judge whether the gang and its equipment were adapted for the work to which they were assigned. As an illustration, taking extreme cases, the figures will have no value for the purpose intended if they were gathered from a small section gang equipped with hand tools, that was assigned to a heavy ballasting job, or from a large extra gang equipped with power tools if it was engaged in renewing ties where the renewals averaged less than, say, one tie to the rail panel.

### Must Know Costs

No manufacturer can long remain in business unless he has complete knowledge of his costs—basic costs, not totals only. There are two reasons why this is so, the first being that an intimate knowledge of costs is necessary before they can be controlled; and the second is that selling prices cannot be fixed with any degree of certainty with respect to profits without this knowledge. In contrast, the railways have no physical products for sale; they sell one thing only—service, in the form of transportation. Unfortunately, the prices at which they sell this service bear little relation to its cost, since they are not based primarily on economic considerations, and are fixed by public bodies that shoulder no responsibility for the financial results of railway operations.

It follows logically that the prices at which transportation is sold bear no relation whatever to the cost of maintaining the property, although this is an important element in the ultimate cost of the service that the railways perform; conversely, the cost of maintenance bears only a distant relation to these prices. Furthermore, in a manufacturing operation, the price of the product fluctuates with the cost of production, including the cost of raw materials, labor, selling, etc. Railway rates are largely fixed and remain fixed regardless of the fluctuations that may occur in the cost of producing transportation service, including the cost of maintaining the fixed property.

For these reasons, there has been little incentive on the part of maintenance officers to inquire minutely into costs or to bother very much about details. Customarily the management allots certain sums for maintenance of way, normally in the form of lump sums, and this is distributed, still in lump sums, to the local maintenance officers. These officers keep strict account of the totals to insure that their appropriations are not exceeded, and report the costs of their operations, again in the form of totals, to the accounting department.

Railway accounting provides no op-

**Any System of Analysis of the Man-Hour Output of Gangs Requires that Accurate Records Be Kept of All Operations in the Field, Either by the Foremen or Other Representative of the Roadmaster or Supervisor**

portunity for recording maintenance unit costs and, in general, is so devised that it is impractical to obtain such unit costs from the accounting records. Even if it were possible to do so, as the accounts are now set up, the results would be given in monetary units rather than in work-output units and, where wage rates differ, the comparisons have no value.

### Must Know Work Output

Furthermore, the divergent opinions that are being expressed on the subject make it clear that those engaged in the debate are thinking more in terms of money than in terms of work output. It seems equally clear that if work-output values are not recorded and used in making the comparisons, this subject is likely to continue to be prolific of discussion, but will result in little else, and each officer, or road, will continue to apply his preconceived ideas without ever knowing whether he is following an economical or an uneconomical course.

It should not be assumed, however, that maintenance officers are altogether to blame for this situation, although in most cases they have been entirely too acquiescent in the matter, for more often than not the policy of the management is such that it discourages the adoption of methods that would be of benefit, not only to these officers, but to the road as well. It seems probable, however, that any officer who will make a presentation to his management backed up by facts, will be able to obtain authority to put into effect a system whereby one may know at all times what the efficiency of his gangs is.

There are two ways in which this system can be operated, both of which must rely on the foreman for the primary information. The first contemplates that the foreman will send to the roadmaster or supervisor a complete distribution of his time daily. This report is divorced entirely from all other reports, particularly those connected with the payrolls. It should show the number of man-hours involved in every class of work on which the gang is engaged, and the units of work completed or accomplished during the day. In some cases these units will have to be established arbitrarily; in others they occur naturally.

A system of this type was tried out recently, and was found to give the information desired in clear, understandable and easily used form. Obviously, it required a certain amount of time and effort to educate the foremen so that they understood fully what was wanted. When they did understand clearly, they gave complete support to the undertaking. Among other things, it was learned that all items of work done must be reported to insure any degree of accuracy. During a preliminary test period, set up partly to educate the foremen how to make their reports and partly to determine just how the system should be applied, all items not relating to maintenance were excluded, that is, such work as clearing wrecks, station service, unloading coal at stations or pumping stations, etc.

In checking the reports, many inconsistencies were discovered and an investigation disclosed that some foremen, with no intention of being dishonest but following a perfectly human tendency, were reporting less time than was actually spent on the maintenance items and were recording on their labor distribution forms more time than they had worked on items charged to other accounts. On the other hand, after the system was put into permanent operation and every item of work was recorded, these inconsistencies disappeared gradually and the man-hour values for various units of work done at different times by the same gang remained practically constant, except as will be mentioned.

No difficulty was experienced in the practical operation of the system and the foremen supported it wholeheartedly. The increased amount of clerical work required of the foremen was neglible; there was a considerable increase in the amount of clerical work in the roadmaster's office, however. If the full benefit that is potential in the system is to be realized, one full-time clerk will be needed for, say, each supervisor's district. In general, he should be able not only to handle the reports but to visit the foremen from time to time to keep them lined up with respect to the promptness and accuracy of their reports.

In the other system, which has been in effect on an important road for a number of years, young engineers are trained in cost accounting and are assigned to certain territories, generally a supervisor's district, to gather information similar, although on a somewhat broader basis, to that that has been described. The general purpose of the two systems is identical and the manner in which they are operated are basically the same, although in some of their details they are quite unlike.

### What Are the Benefits?

What are the benefits, and are they worth the effort and expense involved in gathering and analyzing the information? How shall it be used after it is obtained? No man can work effectively if he bases his efforts on false information, or if he lacks the information necessary to give direction to his effort. In other words, railway maintenance is so large and important an operation and involves so great an expenditure of money, that railway management should insist that those who are engaged in it have a complete knowledge of how it is being done and whether it is being done economically. Man-hour values must be known before answers to these demands are possible. For this reason, such a system has much wider implications than that of comparing section and extra gangs.

Reports of man-hours expended and units of work accomplished provide a documentary and, therefore, reliable source of information regarding details of work accomplished by the various gangs. These reports thus give a direct comparison of the effectiveness of the various gangs, which, in the last analysis, usually means the foreman. Within certain limitations study of these data will give clear information as to the relative man-hour output and, therefore, the relative economy of section and extra gangs for almost any class of work, provided they cover a sufficient period to wipe out the inequalities that are certain to occur in the operations of both organizations when the study covers only a short period.

If there were no other benefits, the effect of the system on the section forces alone is sufficient to justify its adoption. Only a short time is required to show what variations there are in the effectiveness of the section gangs. One of the important benefits that arises from the application of the system is that the gangs of low effectiveness are stimulated to vie with those that stand high in the list. Among the items that are brought out forcibly by the records thus built up, is that low effectiveness in the work of a gang can almost invariably be traced to poor management on the part of the foreman. This then points the way to the type of training the supervisor should apply to these men.

### Gangs Improve Performance

Those foremen who demonstrate a high standard of performance at the start seldom improve to any large extent, but the improvement made by some of those low in the list may be quite surprising. In other words, the ability to measure and compare their own performance with that of others, and the competition thus created tend to stimulate both the foremen and the men to a better organized effort. This improvement is likely to be still more marked if the supervisor himself is capable of training his men to a more co-ordinated effort.

*(Continued on page 832)*

# Eroded River Pier Gets Wrought-Iron Armor

## Badly-damaged structure on the Western Maryland is given jacket of concrete faced with metal plates

WHEN the concrete around the periphery of a circular concrete pier on the Western Maryland became severely eroded, repairs were made by removing the unsound concrete, applying a ring of wrought-iron plates entirely around the pier in the affected area and then filling the space between the pier and the wrought-iron ring with new concrete. In this project the wrought-iron plates served not only as a form for the new concrete but they also act as a means of protecting the masonry against further erosion. Thus, it is expected that the life of the pier will be extended indefinitely.

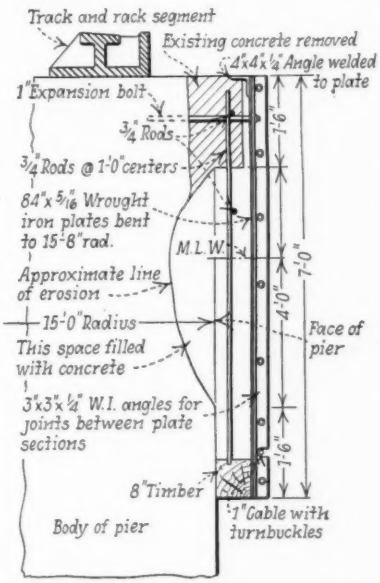
The pier in question is the center pier of the swing span in the Spring Gardens bridge of the Western Maryland at Baltimore. This structure, which was built in 1903, carries a branch of the railroad across the Middle branch of the Patapsco river, a tide-water stream. It has a center-bearing through-truss swing span, 200 ft. long, which is supported on a circular concrete center pier, 30 ft. in diameter. The top of the pier is about 3 ft. above mean low water. As originally built, the pier had a 6-in. coping, 1 ft. 6 in. in depth.

### Nature of Erosion

Because of the abrasive effects of ice and debris in the river and the chemical action of impurities carried on the water, the surface of the concrete in the pier in the vicinity of the mean low-water level suffered severely from erosion. The variation between low and high tide at this location averages about 2½ ft., with the result that the effects of the erosion were noticeable over a range of height. In fact, the eroded area had a width of about 4 ft., and in this area the depth to which the old concrete had been destroyed ranged up to a maximum of about 22 in. The underside of the coping marked the upper limit of the eroded area. While this condition did not affect the stability of the pier, it was evident that the situation was undesirable, and would become worse if not corrected.

### Details of Armor

The wrought-iron ring that was applied around the pier as part of the repair work is comprised of six 5/16-in. plates, 84-in. wide, which are placed end to end with the upper edge of the ring even with the top of the pier. Four of the plates are 16 ft. 5 in. long, while the other two are 16 ft. 8 in. long. They are curved to a radius of 15 ft. 8 in., which is 8 in. greater than that of the pier. Five of the joints are of the butt type and were formed by bolting together, with wrought-iron bolts and nuts, the outstanding flanges of 3-in. by 3-in. by




**Typical Radial Section at the Periphery of the Pier, Showing the Extent of the Erosion and Details of the Protective Jacket That Was Applied**

¼-in. wrought-iron angles welded to the vertical edges of adjacent plates on their outside surfaces. To allow for possible variations in the dimensions of the pier and in the length of the ring due to temperature changes, the sixth joint is of the slip type, with the overlapping edges of the adjoining plates free to move with respect to each other. The ring is stiffened along its upper edge by a 4-in. by 4-in. by ¼-in. wrought-iron angle that is welded to the inside surface of the plates with its outstanding leg flush with their top edges. Thus, completely around the old pier, to a depth of 7 ft., more than covering the fluctuation in water level with changing tides, the pier was afforded a protective armor.

In preparation for placing the protective ring and the new concrete, the first step was to remove the coping and other concrete overhanging the eroded portion of the pier to a depth of about 1 ft. from the edge of the coping, thus allowing space for an opening between the pier and the ring through which the new concrete could be inserted. At the same time all loose or disintegrated concrete was removed from the surface of the pier in the eroded area. Next, the ring of wrought-iron plates was assembled and bolted together over the pier beneath the bridge and then lowered into position.

Near the top of the plates, a row of 1-in. expansion bolts, extending entirely around the pier, was provided for fastening the ring to the old concrete, there being five such bolts to each plate. At the bottom of the ring, the 8-in. space between the pier and the plates was closed by 8-in. by 8-in. timbers, and, to hold the ring securely to the pier at this level, a 1-in. cable provided with turnbuckles was placed entirely around it. Notches for receiving the cable were cut in the outstanding legs of the joint angles.

### Concrete Reinforced

After the wrought-iron plates had been applied the space between the plates and the pier was dewatered and reinforcing rods for the new concrete were inserted. These include ¾-in. round vertical rods which were placed on 1-ft. centers entirely around the pier, and two lines of ¾-in. rods placed horizontally, one line being about 7 in. below the top of the pier and the other about 1 ft. 7 in. below the first. The space between the plates and the pier was then completely filled with concrete, the top surface of which was trowelled off flush with the top of the pier.

This repair work was carried out under the general supervision of G. R. Haworth, who was engineer maintenance of way of the Western Maryland at the time the work was performed, but who has subsequently been appointed general superintendent. The wrought-iron plates were formed and fabricated by the American Electric Welding Company, Baltimore, while all work at the pier was done under contract by Martin G. Imbach, Baltimore.

# Must Streamline Passenger Stations Too, Says Noted Designer

**Points out to bridge and building officers in convention that stations offer greater possibilities than trains, and cites examples of what is being done by "throwing out old junk" and bringing in modern materials and furnishings***

By OTTO KUHLER
Consulting Designer, New York

No. 1 and 2—Before - and - After Photographs of the Waiting Room in the Milwaukee's Passenger Station at Minneapolis, Minn., Showing What Modern Furniture, Lighting and Paint Accomplish

ABOUT two years ago, the operating vice-president of a large railroad received a telegram from the Chamber of Commerce of a medium-size town along the main line, reading: "You have given us excellent service, luxury, speed and comfort with your new streamlined trains. In contrast, your old passenger depot seems older than ever and is a disgrace to the community. We suggest that you modernize it for the sake of good will towards your railroad and greater comfort for our citizens that use it."

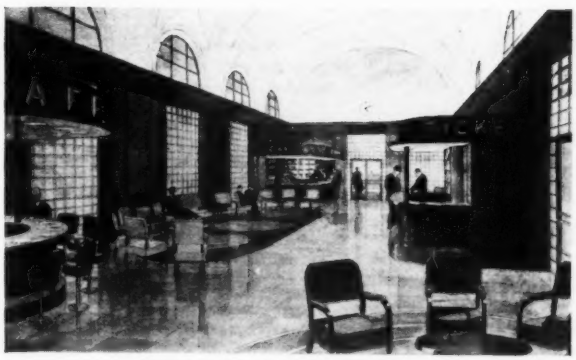
On an inspection tour somewhat later, this same vice-president, now conscious of the appearance of his passenger depots, felt that many of them could be improved and asked me to look into the matter. As you may know, I pioneered in the thought of streamlining locomotives and rolling stock for greater passenger appeal, and, as you may know also, this has brought a large amount of traffic back to the railroads which otherwise would have been lost forever. When streamlining a passenger car, it is not a matter alone of better engineering, weight-saving and general technical improvement, to be executed by the engineering staff, but also a matter of dramatizing these engineering improvements with lines, light and color.

### Give Them Appeal

I know from my experience in dealing with many railroads in this country that they have capable engineering staffs and architects, and that these men are entirely capable of handling all engineering and architectural questions that may arise. However, the modern tendency of streamlining to merchandise, advertise and dramatize the appeals of the railways, has presented new problems concerning which many of these men might well have assistance.

*Abstract of an address presented before the convention of the American Railway Bridge and Building Association, in Chicago, on October 15.

No. 3—The Waiting Room of the Rock Island's Station at Des Moines, Ia., As it Existed Until Recently



No. 4—The Same Waiting Room As it Will Appear When Modernization Work, Now Under Way, Is Completed

Most of the work handled in railroad engineering offices is, naturally, along purely functional lines. Quite naturally, the aesthetic side is of secondary importance in the design of a roundhouse, freight house, or other such facility. When we come to passenger stations, however, the aesthetics of the interior and exterior become of very definite importance, as in this case we are making a direct personal appeal to the traveling public, and often also to community pride. Just as in the case of the many streamlined trains on which I have collaborated with mechanical engineers to incorporate greater passenger appeal, so I have been called in to assist the construction engineer and architect to incorporate into station designs the functional advantages and increased passenger appeal that comes with streamlining.

Our competitors, the bus and air lines, have taken great pains to locate their stations strategically and to make them as attractive as possible, both outside and inside. However, since almost every town grew up around the railroad station, we still have, in most cases, the most strategic position. We usually have well constructed and maintained buildings, but true also, they are usually very much out of style.

Don't misunderstand me. It is not my thought that every old railroad station should be torn down. Likewise, in most cases, it is not a question of improving the station by dragging modern methods and materials into the building, but rather, largely one of throwing out old junk.

## New Materials Aid

In the streamlining of a passenger station we must present the same drastic and dramatic eye appeal to our passengers that we have used successfully in our streamlined trains. I have heard such criticism as "the design looks like a gasoline station, a movie, a World's Fair building." To such criticism my answer must be, "That's fine, because each of the buildings referred to was designed in modern style, with modern materials, and for one reason only—to attract customers. There can be no argument against the fact that all of them attract customers."

In my modern designs, I have used modern materials. I have done this conscientiously because I refuse to fake. I refuse to make wood look like steel, or steel like wood. We have learned today that we can reduce maintenance and heat losses with glass brick, even in such places as roundhouses. Instead of something to stick in a hole for trans-

No. 5—The Men's Toilet Room at the Milwaukee's Passenger Station at Milwaukee, Wis., Before Renovation Recently

No. 6—As This Same Room Appears Today, As the Result of Incorporating Modern Design, Materials and Fixtures

parency, glass has become a structural material. Likewise, stainless steel, aluminum, chromium—all of these, formerly raw materials—have been made into decorative elements that simultaneously reduce maintenance costs. Rubber, asphaltum and asbestos, in their countless colorful combinations, permit us colorful interior and exterior appearances; permanent and inexpensive to apply and to maintain. Modern lighting has endless possibilities, both functional and decorative.

### Examples Cited

As a typical example of what can be done with an old passenger station, I present contrast pictures of the station of the Chicago, Milwaukee, St. Paul & Pacific at Minneapolis, Minn., which was reconditioned recently under my direction, in cooperation with W. H. Penfield and A. O. Lagerstrom, chief engineer and architect, respectively, of that road. In this case, it was purely a matter of rearranging the existing facilities; of throwing out a lot of benches and replacing them with upholstered chairs; of painting the interior; and of lighting the interior with fluorescent light.

Illustrations No. 1 and 2 are before-and-after pictures of the waiting room at Minneapolis. In the old waiting room uncomfortable benches were arranged in a barricade fashion across the main traffic lanes; a newsstand and fountain spread far out into the public area; and the interior was gloomy and dingy due to improper lighting. The remodeled waiting room has a clean, sanitary newsstand and fountain set back out of the traffic lane and properly recessed; upholstered seats arranged along, instead of across the main traffic lane; well-lighted walls and ceiling; and ornamental fluorescent lighting.

What correct lighting and the use of furred plywood can do for an interior is shown in Illustrations No. 3 and 4, which show the waiting room of the Rock Island station at Des Moines, Ia., as it has existed until recently, and as it will appear when modernized. This work was developed with the co-operation of W. H. Hillis, assistant chief operating officer, and David Ruhl, engineer of buildings, and is now under way.

When I traveled as a young engineer in Europe and looked for a boarding house I invariably asked to be shown the bathroom first. If the bathroom was clean, I would usually take up rooming as I could be reasonably sure that the rest of the house would be clean too. Toilet facilities in old stations have the same effect on many passengers. Therefore, they should be carefully improved.

Illustrations 5 and 6 show the interior of the old and remodeled toilet room for men in the Milwaukee's passenger station at Milwaukee, Wis. I am sorry that I cannot show you these facilities in their natural color. You may rest assured, however, that the usual drabness and coldness of the typical old washroom is definitely wiped out by a striking and correct color treatment.

Another point of faulty design in station design is the incorrect location of the ticket office and lack of consideration of its appearance. The ticket office should be located at the end of the main traffic lane. Today, however, in most stations, the ticket office is located somewhere in the wall and is really nothing more than a hole in the wall. To make this worse, this hole usually has a grille over it, which, in itself has a very detrimental effect upon patrons. Imagine buying a shirt, a necktie or a pair of shoes through a grille; then why should we sell tickets through a grille? An open counter, while ideal, is not always practicable because of the flexibility that a ticket office must have to take care of both slack and rush hours. In Minneapolis, we solved this situation by having window openings which can be closed off or opened with roller shutters.

The function of a modern railroad station is entirely different from what it was 30 to 50 years ago, when most of our stations were built. In those days, a man about to take a railroad trip was brought to the station in a horse-drawn vehicle, or he walked, and usually the whole family came along to see him off. It was a big event and, therefore, warranted the proper setting in a large and impressive building. Today, the man, rushed to the station by taxi or bus, hurries in and goes immediately to buy his ticket and then to get on a train. The same haste prevails when he arrives at a station. To take care of this kind of traffic is one of the functions of streamlining the station—to get patrons in quickly and to get them out quickly.

### Parking Area An Asset

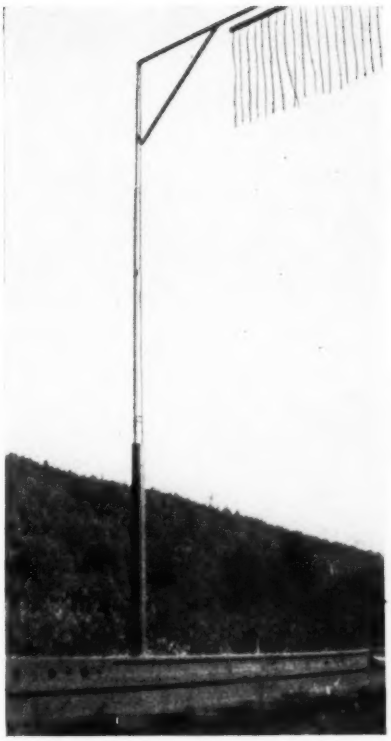
In studying the Milwaukee's station at Madison, Wis., one of the first things that struck me was the fact that there was a useless lawn in front of it. This lawn added nothing to the beauty of the surroundings of the station, and was an economic loss because it had to be maintained. I reasoned that if we paved this lawn area, we could park 40 to 50 cars. In other words, we could practically assure our patrons they would find free parking space at this station.

Today, many of our old stations are too large. We no longer need these large accommodations because of the hurry of the passengers who "breeze" through them. This often permits the railroad to take over some of the unused areas for office space for its clerical staff, with a possible saving in rent and maintenance.

Correct lighting around the outside of an old building, besides its functional advantages, can completely change the appearance of the exterior. In some cases a well-lighted marquee can completely blot out the upper and older part of a building. Unquestionably, on rainy nights, people will be attracted to warm, glowing marquees under which to board or alight from taxis, and, incidentally, they also effectively advertise the railroad's services.

The question of whether to rehabilitate a station or to build a new one can be decided only after careful consideration of local conditions, especially the receipts at the ticket office. In this, the prospects of the future should not be overlooked. Sometimes, due to the relocation of lines or other causes, new stations must be built. As I have already pointed out, parking space is very essential. Likewise, it should be landscaped. The station building itself should have an impressive approach—I said impressive, not expensive.

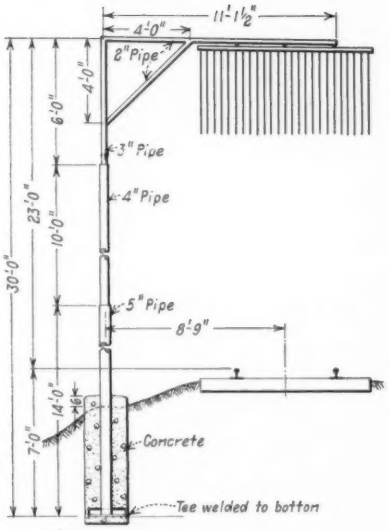
Improved station locations, parking facilities, pleasing and convenient interior facilities, and the general good will of the public that can be brought about by an appeal to community pride, are important assets, which, combined with improved train service, can be used effectively to recapture lost traffic or to develop new traffic. We should all realize that through the strategic locations of our stations, through tradition and habit, and through the tremendous appeal of speed, with safety and comfort, the railways still have a strong position in transportation. At the same time, we should not forget that this position can be held only if every available modern medium is used to impress the man in the street with our services, including newspaper advertising, well-designed comfortable stations and well-designed, fast, modern streamlined trains. All of these are good advertising, and advertise we must if we are to develop new traffic and are to regain some of the traffic that we have lost in recent years.



# Saves Money By Welding Roadway Signs

By ARTHUR L. HAVENS
Welding Supervisor, Rutland
Rutland, Vt.

**By the use of welding methods, new snow flanger signs, slow board signs and tell-tales of better design or of more substantial construction have been built on the Rutland at less cost than the old type of construction**




Left Above—One of the All-Welded Tell-Tales Installed. Left — Elevation Showing Construction and Installation Details for the All-Welded Tell-Tales

ON THE Rutland, as on many other railroads, various types of roadway signs have been constructed in the past of wood or metal or both, with bolted or riveted connections. The life of such signs, if constructed of wood, is limited, and the bolted or riveted connections usually become loose within a few years, causing a sloppy appearance or necessitating considerable additional maintenance and expense to maintain, repair and renew the signs.

Typical of this problem were the snow flanger signs, of which numerous unsatisfactory types have been constructed in the past. One of the first types used on this road was a wooden sign, with a wooden pole to which wooden plates were attached either by nailing or by bolting. Since the signs are taken down each spring, it was necessary to replace hundreds of these wooden signs each time they were installed in the fall. Later the flanger signs were constructed of second hand boiler flues with wooden blades. In the construction of this type of flanger sign, the top of the post was flattened so that the blades could be bolted to the post. This type of construction weakened the post and was unsatisfactory.

### New Welded Snow Flanger Signs

Recently, with a requisition for four hundred snow flanger signs for immediate delivery pressing the stores department, and with no money to purchase new ones, the general storekeeper turned to the welding department to solve the problem. After a careful survey of the available material, second-hand boiler flues and scrap coal car sides were considered most suitable for the job. The flues were selected with a minimum length of 10 ft. and a maximum length of 12 ft. Scrap coal car sides were sheared to the proper dimensions for the blades. The flues were moved to the blacksmith shop where they were pointed at one end by heating to a welding heat and then hammering to a long tapered point. The top end was closed simply by crushing it under the steam hammer. This end was later cut with the acetylene torch and welded to keep out the moisture. The blades were then welded to the pole by the shielded arc process. At the bottom of the post 18 in. from the point, two small plates were welded, one on each side to prevent it from turning in the wind.

In this work, in order to accelerate production, a jig was built to hold the entire assembly for the welding. A plate of quarter-inch steel was

used for this purpose, with short pieces of 1½-in. angle iron welded in place to hold the post in position, and with blocks welded on the jig to hold the blades in the desired position. With this arrangement, one welder working alone welded 30 of these signs per day, and since the material was all scrap, practically the only expense was for labor and welding supplies. The cost of production of these signs, which were superior to the older types, was so low that it was decided to extend this practice to the construction of other types of roadway signs.

One of the Snow Flanger Signs Constructed from Second-Hand Boiler Flues and Scrap Coal Car Sides

### Welded Slow Boards

On the Rutland, it had been customary to construct the slow boards in the blacksmith shop with the blades riveted or bolted to the post. The blacksmiths, however, made a tedious job of this, as the post itself has a number of welds and bends. In the new all-welded construction of these signs, ¾-in. round was cut to the proper length for the entire fork. These pieces were measured for the bends and were cold-bent in an air bending machine. Then the needed number of straight pieces were cut for the body of the post and were welded to the center of the fork, completing the post. The board was welded to the top of the post by tacking the plate or board, as it is called, in three or four places on each side of the post, and finally a small hook of bent ¼ in. round iron rod was welded to the post for the lantern support. The slow boards were then painted and numbered. Another jig was made for use in the welding of these signs. The cost of constructing these boards by this method was substantially less than the former cost of construction.

### All-Welded Tell-Tales

For years tell-tales, or bridge and tunnel warning signs, had been constructed from threaded pipe which called for a number of expensive fittings and, on the smaller railroads, such as the Rutland, where large size dies were not available, the added expense of having the pipe threaded by an outside concern. An added disadvantage with this type of construction was the danger of a strong wind turning the post in its threaded connections, leaving no protection to the unsuspecting brakeman on top of the car. This danger is eliminated with all-welded tell-tales.

### Study of Costs Made

A careful study of comparative costs was made, in which it was estimated that the all-welded tell-tales could be built for approximately half the cost of the threaded type, and it was decided to proceed at once with this type of construction.

The new tell-tales were constructed, as shown in the accompanying illustration, with the bottom or base of the pole made of five-inch pipe, the center section of four-inch pipe and the top section of three-inch pipe. To facilitate the alignment of the pole, small strips of steel ¼ in. by ½ in. in size, were welded to the ends of the pipe entering the larger sizes. The smaller pipes were then inserted about 6 in. into the larger diameter pipe and the joints were welded solid. The crossarm of two-in. pipe was welded in place at the top of the pole in a half-round cut in the end of the three-inch pipe. A diagonal brace of two-inch pipe was then welded at an angle of 45 deg. When welding the diagonal brace in place, allowance was made for the distortion of the three-inch pipe by making a slight reverse bend. The warp in the two-inch pipe was straightened while hot. Although not entirely necessary, a plug was welded in the end of the crossarm to keep out the moisture. At the base of the pole, a piece of three-inch T iron 24 in. long was welded in place at right angles to the axis of the pole by cutting a groove wide enough and deep enough to accommodate the stem of the T-iron in the pipe, locating the T-iron centrally and then welding it solid.

# Tie-Puller Proves Effective

THE Southern Pacific has effected marked savings in the renewal of ties in its Houston (Tex.) terminals during the last two years through the use of Duff-Norton tie-pullers* in both main line and yard service. It has also effected savings in materials by turning ties, particularly switch ties. A number of other interesting uses have also been developed in gaging and lining track and in spacing ties.

### Crosstie Renewals

In renewing crossties with the tie-puller a reduction of more than 50 per cent was made in the man-hours of labor required per tie, as compared with the old method of digging out the cribs. Two men with one tie-puller perform all the tie renewal operations, using it both to pull the old tie out and to insert the new one. The action of the tie-puller is usually facilitated by loosening the ballast shoulder at the end of the tie with a pick. Working in this manner, it was found that two men were able to install easily and continuously 5 to 6 ties an hour, or 2½ to 3 ties per man-hour in rock ballast, as compared to one tie per man-hour by the old methods. When the new tie was the same size as the tie being removed, the work was further speeded up by using the tie-puller to pull the old tie only half way out and then using it to place the new tie, letting the new tie push the old tie the rest of the way. On ties plated with single-shoulder tie plates, it was found to be economical also to remove only one plate before

*The Duff-Norton tie-puller, described on page 181 of the March, 1940 issue of *Railway Engineering and Maintenance*, is a horizontal rachet jack, which grips the sides of the tie and moves it in the direction desired by jacking against the side of the rail.

pulling the old tie, placing the tie-puller at the end next to the unremoved plate.

Aside from increased production, one of the principal advantages found in the use of this tie-puller was the fact that the tie bed need not be disturbed if the new tie is the same size as the old. When the new tie was larger, the tie bed was very carefully cut down and the new tie inserted by the tie-puller to provide a tight fit under the rail. The fact that the bed under the old tie was left so largely undisturbed was found to eliminate churning track and the usual settlement of the tie during a period of several years, and consequently, to eliminate the poor riding condition of the track resulting from this settlement. Still another important advantage with the tie-puller was the fact that since it does not damage the tie in its removal, the tie can be jacked back in place if it becomes apparent after removal that it is good for several more years of service in the track.

The Tie-Puller Grips the Sides of the Tie and Moves It in the Direction Desired by Jacking Against the Side of the Rail

## Turning Switch Ties

The tie-puller was also found to be especially effective in the Houston terminals for turning switch ties. Many of the switch ties were rail cut or were so badly spike cut that it was difficult to maintain gage. In such cases the tie-puller was used to turn ties which would then provide several more years life. Such ties were turned over and also end for end to provide new spiking areas.

In this work, an entire set of switch ties were usually turned. The spikes were pulled on alternate ties, and the tie-puller was used to pull and reinsert them. When half the ties had been turned and spiked, the remainder of the switch ties were turned in a similar manner. Using this method, a test was conducted in which six men turned a No. 9 set of switch ties in gravel ballast in 6 hr. and 20 min. In this operation two men pulled the spikes on the alternate ties and two more men operated the tie-puller.

Above—A Switch Tie Which Has Been Turned, Being Jacked Back in Place — Left—Using the Tie-Puller to Force the Rail to Gage in Gaging Operations

Two men followed, turning the ties and starting them under the rail. The two men with the tie-puller then dropped back and drew the ties into place with the tie-puller, while the other four men spiked up behind. The switch was lined and the ballast dressed, but no tamping was done, and no spotting or gaging was required for a year following the completion of the work.

The total time used for this work was 38 man-hours, whereas it was estimated that the old methods requiring the skeletonizing or digging out of the cribs, would have required 80 man-hours. The difference in cost was said to make it economical to turn the switch ties and obtain the additional life from them.

## Other Uses of Tie-Puller

The tie-puller was also found to be extremely useful in gaging work, particularly at switches and on sharp curves. The gaging was accomplished by preparing the track in the regular way and by then fastening the tie-puller to a tie and jacking against the rail or frog to force it to the gage desired. With a tie-puller, one man can do gaging work, if necessary. The tie-puller was also used to a limited extent to help in lining track, particularly at switches and in other heavy track territory. This was done by pulling the spikes on one tie, fastening the tie-puller on this tie and jacking against the rail or frog to aid the men with the liners, two lining bars being driven in the ballast at the end of the jacking tie to prevent its movement. The tie-puller was also used extensively in spacing ties and, in connection with general spotting and other track work, was used frequently to turn joint ties that had become rail cut. In all of the work, the fact that the tie-puller does not interfere with train movements when the jacking bar has been removed, was found to be of considerable advantage.

# Foreman's Relationship to Well-Maintained Track

**By B. R. Kulp**

Engineer of Maintenance*
Chicago & North Western, Chicago

IN these days of keen competition with other forms of transportation, the demand on the railroads is for higher speeds in both freight and passenger service, and the responsibility of those who are engaged in the maintenance of track is to provide a roadbed which will carry the traffic at the desired speeds safely and comfortably. Due to these demands for higher speeds, the track foreman's relationship to well-maintained track is probably closer today than at any time in the history of railroading, for he is primarily responsible for the upkeep of the individual section.

By necessity, the roadmaster or track supervisor must depend almost entirely on his track foremen in emergencies, and it is essential that he have men upon whom he can rely to protect their individual territories properly. Following your roadmaster's instructions will make for uniformity and no doubt the best results over each section. His success is dependent upon your loyalty and the proper performance of your work, and this in turn reflects upon you. The track foreman is on his own, except when following the instructions of his superior, and for the most part, the proper maintenance of his section is his responsibility. The results obtained by him are a reflection of his ability.

## Programming Essential

The section foreman who systematically programs his work, whether the force allowed him is large or small, is usually the foreman who gets his work done most effectively and shows the most progress, while the foreman who does not have a plan for his work, or is incapable of following out a program set up for him, is usually the foreman who receives the most criticism and accomplishes little of a constructive nature. I appreciate that there are many interferences that frequently interrupt a program, but nevertheless the accomplishments are very marked when a well defined program is inaugurated and carried out.

It is necessary that the track foreman have an intimate knowledge of every foot of his section and that he know what to expect under various conditions. He knows that surface, gage and line, on both curves and tangents, require almost constant attention to meet the standards of maintenance required, and during his regular daily track inspection he must be alert to discover spots which require attention and see that they are cared for as soon as possible. Only in this way can he keep ahead of his track, since rough spots, if neglected, are apt to reach serious proportions and require many times the work originally necessary to restore the track to good condition.

A thorough knowledge of how the track will act during the various seasons of the year is highly important. As soon as freezing weather sets in, most foremen have spots where heaving track may be expected and shimming may become necessary. Such locations must be watched closely or slow orders, which should be avoided if possible, may become necessary. The proper placing of snow fences can often prevent considerable trouble in winter operation, and here again, the track foreman's intimate acquaintance with conditions on his section plays an important part.

During the rainy season there may be sections of track which become soft and require unusual attention. Thorough knowledge of what to expect in these locations and what precautions are necessary to provide for safe operation is essential. Heavy or continuous rains, in addition to causing soft track, may cause washouts or slides in localities which must be well known to the foreman of each section, and the foreman must, if in his judgment it is necessary, make emergency inspections and, if conditions warrant, take the required steps to safeguard train operation.

A foreman's thorough knowledge of his section and a careful study of its requirements should be reflected in the amount of material and labor required to maintain his track properly. The trend today is to reduce the amount of material in stock, and it is the foreman's responsibility to maintain an adequate supply of the necessary materials without an excess. Materials ordered for a specific purpose should be used as soon as possible after being received, particularly if they are ordered to correct some dangerous condition. If excess materials are ordered when not needed, money which would otherwise be available for labor is tied up in inventory.

It is my belief that the yearly tie renewal program presents one of the best opportunities to watch our use of material and possibly to make some improvement. Only careful inspection and good judgment on the part of the foreman will bring about economical tie installation and this is a matter that should be given much thought at the time the tie renewal recommendations are made. The track foreman's intimate knowledge of his section should result in renewing only ties which no longer have useful life.

Treated materials of all kinds should be handled carefully to avoid bruising and fracturing the surface. Approved tie tongs should be used in pulling ties in place in the track and under no circumstances should a pick be used for this purpose. The bruising of treated material, either during its installation or in handling, is certain to open a way for decay, and is unnecessary.

We are all familiar with the benefits obtained from welding in building up rail ends, frogs, switches, crossings, etc. Often the use of welding may be the means of prolonging the life of rails, frogs, etc., economically, and of improving the riding quality of the track. The foreman should be on the alert to call the attention of his roadmaster or supervisor to materials which can be repaired by welding.

## Safety

In order to obtain the best results in track maintenance, it is necessary that the foreman have a thorough knowledge of how to perform his work safely. Safety is of first importance in the discharge of our duties and it should be foremost in the mind of the foreman at all times.

The safety aspect in these days of high speed applies primarily to motor car operation. No motor car should be permitted on the main line without a complete lineup on trains, in so far as it may be available. If the foreman is unable to secure such a lineup, the safe course must be followed, and the operation of the motor car must be protected by flag.

In order to do his work well, the trackman must have well-maintained tools and equipment. The foreman must see that only safe tools are in the hands of his men. If those tools which are not considered safe cannot be repaired by grinding or otherwise, they should be turned in to the

*(Continued on page 830)*

*Abstract of a paper presented before the Big Four Foremen's Association.

# Trucks Replace Work Trains

## For Snow Loading At Terminals

Removing Ice from a Platform in the Coach Yard at Minneapolis, Minn.

**Since 1936, the Twin Cities terminals of the Chicago, Milwaukee, St. Paul & Pacific have been using rented motor trucks for removing snow and ice and have found them not only well adapted to the conditions encountered, but also more effective and economical than the work trains used formerly. This article describes the practices followed in recent years, and points out the results which have been secured**

IN at least one large railway terminal area in a territory of severe winters, plans are already completed to use highway motor trucks for snow and ice removal work, continuing a practice started in 1936, which has proved so effective and economical that work trains, the former method of disposing of ice and snow, have, with but few exceptions, not been used since that year. This is the Twin Cities terminals of the Chicago, Milwaukee, St. Paul & Pacific, embracing St. Paul, Minn., and Minneapolis, which present all of the problems inherent in winter terminal operations, intensified to a considerable extent by periodic heavy snowfalls and protracted periods of freezing weather, with temperatures ranging down to 35 deg. or more below zero.

With almost every kind of railway facility embodied in the Twin Cities terminals, including passenger stations; freight houses; delivery platforms; engine terminal facilities; freight yards; coach yards; and more than 220 miles of tracks in main lines, yards, leads and industry tracks, including 4½ miles in planked or paved streets or highways, winter conditions within this terminal present a serious problem under even favorable conditions. Especially in view of the protracted freezing spells which frequently extend over periods of three weeks or more at a time, a prompt clean-up after each storm is necessary to preclude the possibility of excessive accumulations of ice and snow with succeeding storms. Even in the absence of storms, the problem of ice about the tracks, as the result of water dropped from trains, car washing, carelessness in watering engines, etc., becomes serious in prolonged periods of cold weather unless the ice is picked out and removed periodically.

### Give Up Work Trains

Prior to 1936, and in part during that year, the Milwaukee used work trains for practically all snow and ice removal at the terminal, loading the cars by hand and disposing of the material over the sides of bridges and embankments. Involving work-train charges, with much lost time awaiting an opportunity to use the tracks desired, this proved a costly method of disposal. Equally serious was the fact that frequent train and engine movements in passenger, freight, switching and engine terminal operations seriously restricted the occupation of tracks by the snow trains, not infrequently making it impossible for them to reach points desired for long periods of time, and then only for relatively short intervals. Under such conditions, large snow removal forces, which had to be lined up to load trains as soon as they could be switched into position for loading, lost many working hours.

As a result of these conditions, the terminal officers began experimenting with the use of highway motor trucks for disposing of snow and ice during the winter of 1936, renting the trucks from local contractors, each with an operator. This proved so practicable and economical as compared with snow trains, that the use of these trains was abandoned, and all snow and ice removed since 1936, with few exceptions, has been done with trucks. During one period in the winter of 1938, 20 trucks were employed at a time, and on other occasions from 12 to 14 trucks have been used.

### Experience With Trucks Favorable

The experience at this terminal has been that, with advance arrangements with local contractors, trucks are always available in any number desired, and especially during and immediately following storm periods when much normal construction work is slowed down or at a standstill. Thus, late in the fall, arrangements are made with contractors to have their equipment ready for immediate service on call —to be furnished with drivers. The trucks used are of the self-dumping body type and have a normal capacity of 1 to 2½ cu. yd., but, equipped with snow boards along the sides, they hold up to 2 cu. yd. for the smaller

trucks and 4½ cu. yd. for the larger.

It has also been the experience with these trucks that there are few points that cannot be reached with them. They are driven longitudinally along or across tracks at will, both in yards and at stations, moving about as necessary to clear for trains; they are operated freely over driveways of any character and on station platforms as may be necessary; and they can be moved rapidly from street crossing to street crossing as may be required to clear up snow and ice accumulations, caused either by plowing or sweeping snow onto the tracks; or by drippings from cars. Furthermore, they are highly effective in moving men from one point to another, where most needed, and for transporting snow-fighting tools and supplies.

In all cases the trucks are loaded by men with shovels, a group of six men usually making up a loading crew, with four men loading and two men picking out ice or cleaning up. Each such loading crew can usually keep four or five trucks busy, depending upon the character of the work and the length of haul to points of disposal.

Simplifying the work of the loading crews, the terminal forces have available to them two stores department trucks equipped with front-end plows, and a tractor-equipped broom, which are used to clear platforms and driveways, quickly opening up these facilities for normal operations and, at the same time, piling the snow so that it can be loaded readily. Oil-burning switch heaters solve the snow and ice problem at several interlockings and at many outlying switches at the terminal, but where these devices are not provided, either in yards, the engine terminal or the main tracks, the switches are cleared by hand, the snow being piled alongside, to be loaded out in the trucks as quickly thereafter as possible. Speeding the work of ice removal also, is the extensive use in certain areas of pneumatic tie tampers with special ice-cutting tools, these being driven either from terminal air lines or portable compressor units.

### Flag Protection Afforded

Much of the snow truck operation is entirely in the clear of trains and requires no special protection. However, whenever the trucks operate on or otherwise foul tracks, they are given two-way flag protection by men sent out from the gangs. In clear weather, this is not as essential as in the case of work train operation, both because of the flexibility of the trucks, which can be moved quickly out of the way of trains, and because of the fact that train operation throughout the terminal area is relatively slow, but is practiced for greatest safety.

Loading a Truck on One of the Important Railroad Viaducts in the Minneapolis Terminal

The disposal of snow and ice by trucks also permits great flexibility of operation and, in the case of the Twin Cities terminals, with relative short hauls in most cases. Disposal is made wherever it seems most desirable and economical under the circumstances, sometimes in ravines, sometimes in vacant lots, at other times in sewers, and at still other times in the Mississippi river, which traverses this area.

All of the contractors' trucks employed by the terminal are rented on an hourly basis, with fuel and drivers furnished, at rates ranging from $1.35 to $1.75 an hour, depending upon the size of the truck. Through this arrangement, the railroad is assured of adequate equipment and competent drivers, without any of the responsibilities inherent in the ownership of the equipment, and at over-all costs far less than comparable results with snow train operation.

The practice of employing trucks for snow and ice removal work in the terminals was inaugurated under the general direction of W. H. Penfield, chief engineer of the Milwaukee, and is being carried out under the immediate supervision of A. Daniels, division engineer, and R. J. O'Connor, roadmaster.

## Foreman's Relationship

*(Continued from page 828)*

store department for replacement. It is important that tools of all kinds and materials carried on motor cars be properly loaded, for very serious accidents usually result when tools or material fall off a moving car.

### Importance of Motor Car

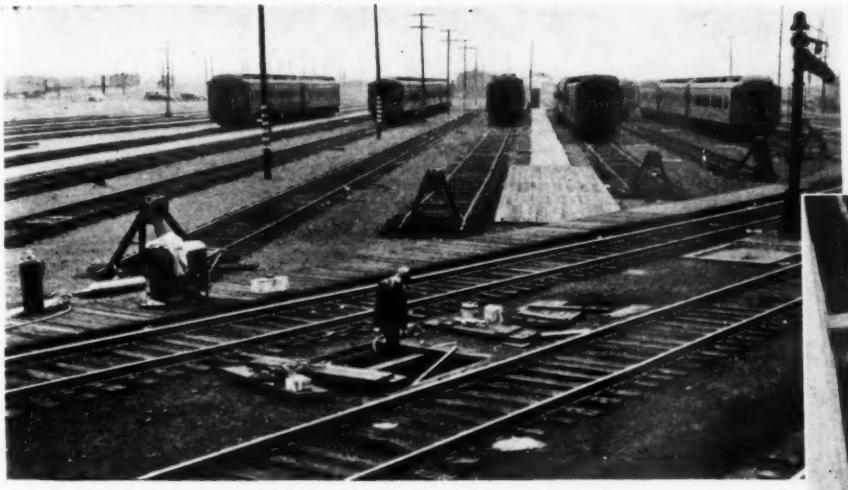
The performance of the trackman's motor car has much to do with good track maintenance and it is important that the foreman see that the car is maintained in condition to operate at all times. Proper care of the car and the following of instructions for its operation will do much toward keeping it in a good operating condition and in prolonging its life. A car which is always giving trouble is not an asset to the railroad and, if it cannot be repaired readily in the field, it should be replaced by a relief car and sent to the shops for overhauling.

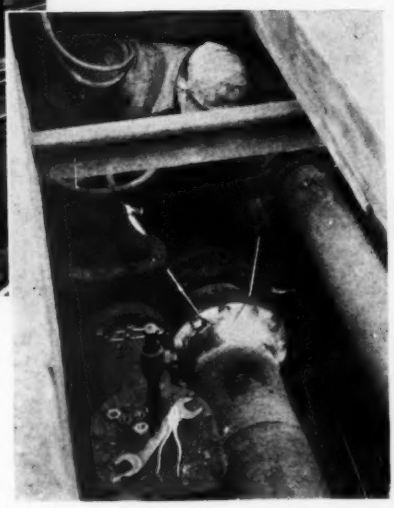
Not the least part of a track foreman's relation to well-maintained track is his housekeeping. This applies not only in the vicinity of his tool house and through station grounds or yards, but out on the line as well. All old material should be picked up from one end of the section to the other and disposed of as scrap or otherwise. The cleaning of weeds under timber bridges and around buildings at the proper time should not be overlooked as a fire preventative.

### Detect Rail Damage

Higher standards and greater refinement on the part of section forces in maintaining track are doubly important with the advent of the higher speeds of the last few years. This is especially true of rail damage, for improper equipment at high rates of speed may cause damage to the rail that will accumulate if the causes are not eliminated. Any unusual defects in the rail should be reported immediately to the supervisors.

As your roadmaster or supervisor is constantly learning new and better methods and conveying them to you, you should not overlook the training of the men in your gang and should impart information to them. It will increase their interest in the work and will be reflected in the more efficient maintenance of your section. In addition to the benefits which will accrue to the railroad from your training of young men, I am sure that you will take a certain amount of personal pride in knowing that you have had a part in the training of some individual for promotion to the position of track foreman or higher.





Left—The C. & W.I. Coach Yard, Showing a Welder Entering One of the Pipe Tunnel Manholes. Below—Bronze-Welding One of the Screw Connections in the Steam Line

# Bronze-Welding Saves Old Leaking Steam Line

**This article describes the manner in which 78 corroded, leaking joints in a 10-in. to 5-in. heating line in the coach yard of the Chicago & Western Indiana, at Chicago, are being repaired, completely rehabilitating the line at a fraction of the cost that would be involved in its renewal**

WORKING in the cramped quarters of a concrete pipe tunnel, and yet effectively, welders in the bridge and building forces of the Chicago & Western Indiana are extending the life of a long yard steam heating line, already 35 years old, by repairing 78 leaking joints by oxy-acetylene bronze-welding. When the work is completed, the steam line will have been restored to fully serviceable condition at a cost that is nominal as compared with complete renewal, without interference with yard operations and with the prospects of prolonging the life of the line at least 8 or 10 years. In fact, located in a congested tunnel, renewal of the line in its present location would have been extremely difficult and, if done, would have cost approximately seven to eight times the estimated cost of the welding work.

### 3,000 Ft. Long

The steam line in question is located in the coach yard of the road between Forty-Ninth and Fifty-Fourth streets in Chicago, and is used exclusively for winter coach and building heating. It is approximately 3,000 ft. long and, from its power house connection, is made up progressively of 10-in., 8-in., 6-in. and 5-in. pipe, covered with an insulating jacket of asbestos felt. Throughout its length, longitudinally between and transversely beneath tracks, the pipe is located in the bottom of a concrete box pipe tunnel, 5 ft. by 5 ft. in section, which also houses two water supply lines, a fire line, low and high-pressure air lines and a summer, high-pressure steam line. Where located longitudinally between tracks, the concrete top of the tunnel is exposed, forming a walkway, but at other points it dips beneath individual tracks or groups of tracks, with its cover supporting the tracks and the loads moving over them.

To afford ready access to points along the various pipe lines, the tunnel is equipped with manholes at intervals varying from 50 to 100 ft., the larger of these being essentially daylighting openings over working chambers, the full width of the tunnel and about eight feet long, which are covered by three-inch planks. These larger openings, when fully uncovered, permit the handling of pipe lengths out of and into the tunnel and afford greater daylighting about the principal joints, valves and connections in the different lines, which are usually located directly beneath them. Auxiliary manholes, approximately 20 in. by 20 in. square, with steel plate covers, are located at intervals between the larger working holes, these being intended primarily to facilitate inspections of the various pipe lines between the larger openings.

The large steam line that is being repaired is made up of steel pipe, with two types of joints—(1) bolted flanged joints, with screw connections into the two cast iron flanges which make up this type of joint, these being located at intervals of approximately 20 ft., and (2) expansion joints of the packed sleeve type, located at intervals varying from about 50 ft. to 100 ft. With periodic repacking, the expansion joints gave little trouble, the only real difficulty with the line developing in the screwed connections of those flanged joints that are located in the manhole areas and subject to corrosion from drip through the manhole covers. The

intermediate flanged joints in the line, with few exceptions, showed no corrosion or leakage.

### Details of Welding

The actual welding of the leaking joints involves the placing of a bronze-welded fillet between the pipe and the bead on the flanges of the joints, to reinforce and seal the screw connections. This is a relatively simple operation in itself, but requires that the line be out of service, and that several preliminary steps be taken so that the pipe can be turned for welding. In these preliminary operations, the insulating cover of the line is removed from the joint to be welded, and at each of the points of support of the line back to the next connection, the latter being done so that the pipe can be rotated without damaging the covering material. Then, the joints immediately on each side of the one to be welded are broken by cutting off the bolts with an oxy-acetylene blowpipe in the case of a flanged joint, to be replaced later with new bolts, and by backing off the packing ring collar in the case of an expansion-type joint. With the pipe freed on each side of the joint to be welded, the first operation preliminary to the welding is to clean the weld area down to bright, sound base metal, using an electrically-driven wire brush or a four-inch grinding wheel as may be required by the degree of corrosion. This work is carried on simultaneously on both joint seams as the pipe is turned, until the entire periphery of the pipe in both weld areas has been cleaned. Turning of the pipe is done with a chain wrench, with an extension handle extending up through the manhole where proper leverage can be obtained.

**The Pipe Line Is Rotated by Means of a Chain-Type Wrench as the Weld Progresses Around the Joint**

The joint welds themselves are made entirely down-hand, and completely around the pipe in a continuous operation, the pipe being again turned as necessary, a few inches at a time, to this end. The weld in each case, which is a bronze-weld, in which the rod material is sweated on rather than puddled, is extended out to cover all exposed threads in the pipe and then up and over the top of the bead of the coupling. Each weld has a face width ranging from 2 to 2½ in., with a maximum throat or thickness of about ¾ in., and, in the case of the 10-in. pipe, is approximately 3 ft. long, involves approximately 4 lb. of weld metal, and requires about two hours to complete.

In all of the welding, Oxweld 25 M bronze-welding rods are being used, the heat being applied with Oxweld W 24 R blowpipes with 60-cu. ft tips. After the completion of the weld on one side of a joint, the same operation is repeated on the opposite side, completing the repair of the joint. The remaining work then involves the turning of the pipe 180 deg., i.e., top for bottom; the recoupling of the line where broken, and the replacing of the insulation that had been removed.

From one to three welders have been employed in the welding work thus far, as available, each taking a joint at a time and each being assisted by a helper. So far as possible, bridge and building department plumbers and plumbers' helpers are being employed in the preliminary work of breaking and uncovering the line for welding, and in the follow-up work of reconnecting and recovering it. The work as a whole is being done under the direction of A. B. Hillman, engineer maintenance of way, and under the direction of M. Meyers, supervisor of bridges and buildings at Chicago.

## Section or Extra Gang?

*(Continued from page 820)*

Not much has been said about recording this information for extra gangs. There is seldom as much work involved in recording their operations as there is for section gangs, first, because they are fewer in number and, second, because their work usually involves a limited number of items. Again, because a supervisor's district or a division seldom has more than one extra gang engaged on a particular kind of work, the value of the record of these gangs does not lie so much in the opportunity to compare the performance of the extra gangs with each other as it does in the opportunity afforded to compare the man-hour output per unit of work for the section and extra gangs. On a regional or system basis, however, the comparison of the performance of extra gangs doing the same kind of work will be of considerable value.

Among the by-products of the system are the greater degree of accuracy in thinking that is engendered among foremen, and the closer attention they give to the details of their work. In other words, supervision is definitely improved so far as the gang is concerned. The same is true of the supervisor, for he gets a new insight, not only into the actual working of his gangs, but into their potentialities, which cannot fail to have a favorable effect on the management of his district or territory.

### Has Many Advantages

Such a system has many advantages and no disadvantages. The only criticism that has been leveled against it is that it demands an expenditure to put it into effect and to keep it going. A limited experience indicates, however, that the economies that are engendered will far more than offset this initial and continuing expenditure. Furthermore, any maintenance officer who will utilize the system to the limit of its potentialities is always prepared to say what is the best and most economical way to do any class of work that may be under discussion. In other words, it takes the guess work out of maintenance and puts it on as nearly a scientific basis as it is possible where the human element is involved so largely.

Every maintenance officer is conscious of the insistent demand for greater economy in maintenance that was mentioned in the editorial. No one conversant with the facts will deny that maintenance officers as a whole are making strenuous efforts to satisfy this demand. Yet, it is clear that most of them are trying to meet it without having possession of essential facts concerning their operations, the most important of which is the man-hour output that can be expected from the various types of gangs engaged in the work to which they are assigned, and the variations that may be expected in this output as the tools with which they are equipped and local conditions vary. Conditions are such today that these officers must know that they are following the most economical methods available, and this knowledge can come only when they are in possession of all of the facts.

# Compound Fissure Causes Serious Train Derailment

ON August 25, a freight train on the Baltimore & Ohio was derailed near Sykesville, Md., as the result of the breaking of the rail at a compound fissure, causing the death of three employees. The accident occurred on that part of the road known as the West End, which extends between Point of Rocks, Md., and Relay, a distance of 58 miles. The line is double tracked, and, in the vicinity of the accident, the alignment is a succession of curves, the sharpest of which is 10 deg. The break in the rail occurred in the eastward main track, in the high rail of a 9-deg. 45-min. curve, at a point 6,200 ft. east of the station at Sykesville and 125 ft. from the east end of the curve.

The evidence taken at the investigation and reported by the Bureau of Safety, Interstate Commerce Commission, from which report this information is abstracted, indicated conclusively that the accident, which resulted in the derailment of the locomotive and tender and the first 22 cars of the 86-car train involved, was caused by a compound fissure in the rail. Furthermore, while the testimony was in agreement that the speed of the train at the time of the derailment was from 25 to 30 m.p.h., in spite of a maximum authorized speed in this territory of 25 m.p.h., it was not considered that this was unduly excessive and had any bearing upon the accident.

### 130-Lb. Rail

The track structure at the point of derailment consists of 130-lb. rail, 39 ft. in length, which was laid new in 1932 on an average of 22 treated hardwood ties to the rail length. It is fully tie-plated, double-spiked on the gage side of the rail and single-spiked on the outside, and is equipped with four-hole continuous angle bars. The ballast consists of 12 in. of crushed rock under the ties. At the time of the accident, the superelevation in the eastward main track at the point of derailment was 3 in. The gage varied from 4 ft. 8¾ in. to 4 ft. 9 in.

The testimony at the investigation brought out that the rail in the curve involved was considerably curve worn, the wear being as much as 1⅛ in. at the center of the curve, measured at the gage point. The division engineer in charge of the territory involved, however, considered that the standard to which the track was maintained was fair and adequate for the speed permitted. The testimony also brought out that there had been a number of rail failures on the line between Point of Rocks and Relay during the previous year, these including 53 transverse fissures, 2 compound fissures, 5 vertical split heads, 7 horizontal split heads, 8 crushed heads, 56 progressive fractures and 51 bolt hole breaks. No rail flaw detector car had been operated in the vicinity of the accident, and the division engineer expressed the opinion that he did not think satisfactory results would be obtained if a detector car test was made, because of the number of wheel-burned and flowed-head rails. During the early part of 1940, detailed inspection was made of all rail in this territory by the engineer of maintenance, accompanied by supervisors and section foremen. All defective rails found were replaced. The division engineer and the track supervisor also made inspections of the rail in question while passing over the territory.

Summarizing the evidence taken in connection with the derailment, the report of the Bureau said, in part as follows:

"Subsequent to the accident, examination disclosed that a rail on the high side of the curve, at a point 702 ft. east of the west end of the curve, had failed on account of a compound fissure. This break was 6 ft. 10 in. east of the receiving end of the rail and extended downward through the head, web and base. A piece of metal 7/16 in. deep and 2½ in. long was broken from the head of the rail. Beneath the chipped-out piece there was an old, progressive crack about ⅝ in. below the head, extending horizontally a distance of 5¾ in. At one end of this crack there was another crack 1 in. wide, extending downward ¼ in.; at the other end of the horizontal crack there was a crack the width of the head, extending downward about ⅞ in. The gage of the track varied between 4 ft. 8¾ in., and 4 ft. 9 in. The rail on the high side of the curve was worn 1⅛ in. inward from its original contour; however, it was not worn to the railroad company's condemning limit. Regular inspection of track in this territory is conducted by the maintenance of way force and several rails had been taken out recently because of transverse fissures.

"A chemical analysis of the rail steel made subsequent to the accident disclosed a deficiency of carbon, which varied between 0.05 and 0.10 per cent lower than the analysis of the ladle at the mill. The evidence also disclosed that all 'A' rails from the same ingot as that of the broken rail had been rejected at the mill. The broken rail contained a 'pipe' condition adjacent to the point of break and there was segregated metal in the head just below the horizontal crack. It is apparent that the metal of the rail was not according to specifications, was probably segregated, and that the 'pipe' condition developed into a compound fissure. From these facts it is apparent that the rail was of poor quality when first laid."

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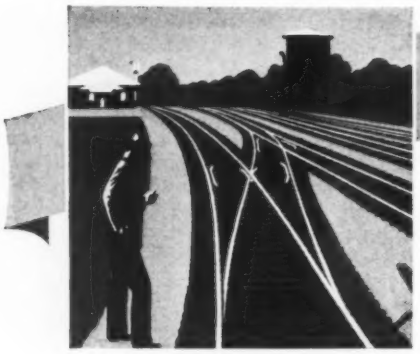
## Joint Committee Reports on Concrete

CULMINATING a work that has been under way continuously since 1930, the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete has recently submitted to its constituent societies a report including Recommended Practice and Standard Specifications for Concrete and Reinforced Concrete. These societies are the American Concrete Institute, the American Institute of Architects, the American Railway Engineering Association, the American Society of Civil Engineers, the American Society for Testing Materials and the Portland Cement Association.

The report records numerous advances relating to the design, construction and other practices in the manufacture and placement of concrete in structures. It is issued in three sections, comprising 140 pages, (1)—Recommended Practice, including scope and definitions, materials, details of manufacture and placement, protective treatments, surface finishes and design; (2)—Standard Specifications, including requirements for materials, manufacture, curing, reinforcement and testing; and (3) Appendices, covering the effects of various substances on concrete and suggested protective treatments; support moments in continuous beams and frames; information relating to the curing of portland cement concrete; and a list of the A. S. T. M. specifications cited in the report.



# WHAT'S the Answer?

## Second-Hand Bolts and Spikes

*Should second-hand bolts and spikes be reused in main tracks? If so, to what extent is this permissible? If not, why?*

### Not on New Rail

By G. S. CRITES
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Second-hand bolts and spikes should not be used when laying new rail in either main or other tracks. The original cost of the new rail and joint bars justifies the expenditure necessary to fit them with new bolts and new spikes. This might not be said so emphatically if there were no place else where second-hand usable spikes and bolts can be applied. As a matter of fact, the demand for second-hand fastenings for use with old rail always exceeds the supply. It should not be overlooked in this connection that there is no economy in using the second-hand items with new rail, for exactly the same amount of out-of-pocket cost is saved when a second-hand bolt is substituted for a new bolt on old rail, as is saved when it is used with new rail.

If the released rail is suitable, or can be made suitable, for laying in main tracks, a careful study should be made of the use to which it will be subjected. This will be an excellent guide in making the decision whether new or second-hand bolts and spikes are to be used. If the fishing surfaces at the ends of the old rail are good, if the rail ends are to be reconditioned by welding, or if the ends are to be sawed and then ground and heat-treated after the rail is laid, this rail should be considered as new rail and treated accordingly; that is, new bolts and new spikes should be used when it is being laid.

Obviously, if there is a surplus of good usable second-hand bolts and spikes, over and above the demand for secondary tracks, yards and sidings, it will be economical to use them when laying released rail in main tracks, rather than to scrap them, but such cases are exceptional.

Rail joints should be kept tight at all times, and bolts that fail to function in this respect should not be used. Likewise, spikes that do not engage the flange of the rail fully are not doing all that they should do and should not be used in either main or other tracks.

### Must Be in Good Condition

By G. L. SITTON
Chief Engineer Maintenance of Way and Structures, Southern, Charlotte, N.C.

When laying new rail, it is our practice to use new joints, new bolts and new spikes. Released rail, if fit for main-track use, is sent to lines of lighter traffic to be reused. The condition of the rail determines whether it shall be sent to a line of secondary or of less importance. We have lines on which the traffic varies from almost nothing to quite heavy, and we have no trouble in finding a place to lay any rail that we release. Generally, the joints and the bolts go with the released rail, and are used again with the rail when it is relaid. In contrast, we seldom transfer the second-hand spikes with the rail, joints and bolts. We are just starting the practice of using anchor spikes with our tie plates, and from now on we will use the best of the released spikes for this purpose.

When relaying rail on branch lines, we do not reuse the bolts unless they are in good condition. If they have been badly corroded by brine drippings and have lost a considerable per-

**Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.**

### To Be Answered In February

1. *Where section gangs have been reduced to substantially skeleton organizations, is it practicable to program routine section work? If not, why? If so, what are the advantages?*
2. *What items of emergency stocks should be carried for buildings? Why? Where should they be located?*
3. *What advantages result from the use of rail and flange lubricators? What disadvantages? What is the minimum degree of curve to which they should be applied?*
4. *What are the advantages and disadvantages of installing or renewing pipe culverts during the winter season?*
5. *To what extent is it practical to replace worn motor car engines in the field? What are the advantages and disadvantages? How should it be done?*
6. *Should a new pipe line, or one that has received extensive repairs, be tested before the trench is back filled? Why? If so, how should this be done?*
7. *What can be done to repair a highway grade crossing when it has heaved badly?*
8. *Is there any advantage in welding the circle rail for a turntable to make a continuous rail? Any disadtage? Why? If not, should the rails be end hardened?*

centage of their strength, we do not use them again in main tracks, or in busy yard tracks or sidings. For several years we have been oiling our rail that is subject to brine damage and this has reduced the damage the bolts suffered formerly. I think the real answer to the question will be found in the condition of the bolts and spikes and the density of traffic on the line concerned, but I believe that where new joints are used, one is justified in going to the expense of using new bolts, although the use of serviceable second-hand bolts is equally justified with old joints.

The use of double-shoulder tie plates and of power machines for driving and pulling spikes should result in improvement in the quality of second-hand spikes. I think it is a good idea to handle second-hand bolts and spikes through a reclamation point where they will be sorted according to condition, and then to reuse them on lines where the importance of the line corresponds to the condition of the bolts or spikes. Obviously, this would not include the use of scrap or damaged material. On this road we have not yet put this practice into effect, most of the sorting being done by the division that receives the spikes and bolts from a heavier-traffic division. We do not intend to ship scrap bolts or spikes from one division to another, but sometimes the work is not supervised closely enough to prevent such shipments.

### In Ordinary Repairs

By N. F. Alberts
General Foreman, Chicago, Milwaukee, St. Paul & Pacific, Chicago

When repairs are being made to main tracks, such as replacing defective, broken or damaged rails; renewing or repairing frogs, switches and crossings; regaging track; renewing ties; and numerous other routine maintenance tasks; many bolts and spikes are released or recovered that are suitable for further use. No trackman should hesitate about reusing such material when in his judgment it has a prospective service life of several years, and particularly if this service life corresponds with the prospective service life of the rail with which it will be used.

In general, the determination with respect to the reuse of released small materials is the responsibility of the man in charge of the work. Certainly no objection can be raised when second-hand bolts and spikes are recovered and reused on the same job. On the other hand, when an out-of-face job is under way, such as renewing rail, the use of second-hand bolts and spikes should be avoided. Considering that the new rail will be expected to give many years service, new bolts and spikes should be used. When nuts are removed from bolts with either a track wrench or a power wrench, the threads of track bolts are likely to be damaged to some extent, and such bolts are not suitable for use on new rail, since they seldom retain tension as new bolts do.

Track spikes, even newly driven new spikes, are always bent slightly when withdrawn from the ties with a claw bar, and their holding power is decreased considerably. Such spikes should not be employed as fastenings for new rail. If they must be used, it should be for anchor spiking only. On the other hand, if power spike pullers are used, the situation is different, since they rarely damage good spikes. In such cases, spikes that have not served long and that come out of the ties straight and undamaged, may be used freely for spiking newly laid rail.

When ties are renewed, the new ties should be spiked with new spikes to insure spikes that will have a life approximating that of the ties, and thus avoid tie damage by respiking. All second-hand spikes and bolts recovered from an out-of-face rail renewal or a tie-renewal job should be sorted carefully and reused in yard tracks or sidings.

## Emergency Bridge Materials

*What emergency stocks of bridge materials should be carried? Where should they be located? Who should be responsible for them? How should they be handled?*

### Has Them at Eight Points

By G. A. Haggander
Assistant Chief Engineer, Chicago, Burlington & Quincy, Chicago

At present the Burlington is carrying emergency stocks of bridge material at eight points, besides the large stock that is carried normally at two timber-treating plants. The smallest stock we maintain at any point is sufficient to construct five panels of temporary trestle. These stocks consist of treated timber and piles, and are turned over periodically to prevent too much deterioration of the material. The amount of stock carried, and the lengths of the stringers and of the piling at any point are governed by the probable requirements in the territory which the stock is intended to protect.

On lines having high bridges or bridges subject to deep scour, longer piles are provided than elsewhere. The size of the stock depends also on the distance from the nearer of the two treating plants, where a larger supply of timber of all required sizes is always available. The basic purpose of the emergency stocks is to make material available immediately after a disaster so that the work of rehabilitation will not be delayed. These local stocks are large enough to keep the local forces employed until additional material can be received from the stocks maintained at the treating plants.

Periodically, the stores department issues a list of emergency material for the protection of bridges and tracks in the event of washouts or other damage. This department is responsible for the immediate replacement of this material when any of the stock has been used. The question of the location of the emergency stocks and the amount to be carried is canvassed periodically to determine whether the stock we are carrying and the place it is stored are meeting present requirements. This method of handling these stocks has proved to be successful, and it allows us to get along with a relatively small amount of material tied up for emergency purposes.

### Thinks It Wise

By C. C. Westfall
Engineer of Bridges, Illinois Central, Chicago

The advisability of carrying emergency stocks of bridge material will depend entirely on the individual railway, including the number and location of storehouses where stocks of timber and piles are carried regularly, the type of bridges and the amount of timber-bridge work normally under way. In our own case we have many timber bridges and in the past the replacement of untreated trestles with creosoted structures has called for a rather heavy program of bridge work. As a result, we were compelled to carry a considerable quan-

tity of bridge material at different points for the replacement program. This material was always available for emergency use and, together with the storehouse stocks, met all of our emergency needs.

As our replacement program progressed, the volume of work decreased and, as it was curtailed further by the depression, less material was distributed along the road and we were not so well fortified with potential emergency stocks as we had been. On our Southern lines our needs are covered by the number and location of the treating plants where we have stocks of both treated and untreated timber and piles.

On our Northern and Western lines the situation was not so favorable, but by watching the stock at one storehouse a little more carefully and by placing an emergency stock at another storehouse, where we do not ordinarily carry a stock of bridge timber, we are protected adequately. This stock consists of creosoted timber and piles sufficient for the construction of an open-deck trestle 100-ft. long.

We stock creosoted material because it can be carried for a considerable time without deterioration. On the other hand, untreated material will decay in long storage, and must, therefore, be used and replaced at frequent intervals. Since our emergency requirements cannot be depended on to insure a turnover every year or two, it is considered impracticable to maintain a stock of untreated material for emergencies. On those lines where the bridges are generally of the so-called permanent construction, availability of an emergency stock is not important. Where there are many timber bridges I consider it highly desirable to have a stock readily available which can be loaded quickly and sent to the point of emergency.

### Carry at Storehouses

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

We consider that every bridge gang should carry a small stock of emergency material with its outfit cars. This includes caps, ties, stringers, guard rails, braces and posts and sills sufficient to construct a three-panel bridge if necessary. On lines having a large amount of timber bridge construction, we carry sufficient material to construct a four-panel pile or timber trestle, at division headquarters. This material, except posts and sills, is replaced with new material at intervals of 8 to 10 months.

We get such excellent co-operation from the stores department that we find it unnecessary to carry large stocks on the division at points where there are no stores department employees and no power machines for doing the loading. The stock on the outfit cars will keep the gangs going until the stores department shipment arrives. I remember several years ago, when a trestle 1,720 ft. long was destroyed by fire, that by the time the site was cleared enough to get the work started there was sufficient material on hand to begin with and it was fed to us fast enough and in the correct order so that, although 14 bridge gangs were engaged in replacing the structure, there was no delay at any time. Similar cases have been handled in a similar manner.

### Must Not Be Unwieldy

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Emergency stocks of bridge materials are in the same category with emergency track materials carried with wrecking cranes, but will be somewhat more varied to meet local conditions. The stores department should be responsible for both regular and emergency stocks of bridge materials. The size of the stocks to be carried and their locations will depend entirely on local conditions, including the prospect of immediate delivery of purchases. It is poor economy to carry large but little-used stocks if conveniently located mills or factories can supply the needed materials on short notice.

Where emergency materials cannot be assembled in this way on short notice, the stores department should be required to hold emergency stocks at its regular material yards. Usually, these stocks will consist of materials that move freely when programmed repairs are under way and cannot be classed strictly as emergency stock. For the usual run of small emergencies, it is best to have a stock of readily movable material at division or district headquarters, from which it can be shipped quickly, generally with the gang outfit.

Local conditions will govern the amount and kind of materials that should be carried in this stock. Usually, the stores department should be made responsible for the maintenance of such stocks, but local conditions may make it advisable for the local bridge and building forces to handle such stocks. A word of caution is in order here, however, for where this is done there is always a marked tendency for such stocks to grow to unwieldly proportions.

## What Kind of Flanger Sign?

*What is the most practical and economical type of flanger signs? Why? When and how should they be erected? How and where should they be stored in the summer?*

### Must Be Distinctive

By H. R. Clarke
Engineer Maintenance of Way, Chicago, Burlington & Quincy, Chicago

The most practical type of flanger sign is one of such distinctive design that it cannot be mistaken for anything else, and it should be one that can be left in place permanently. Our standard flanger sign is a rectangular target 1 ft. 6 in. by 5 in., fastened to a metal post at an angle with the horizontal. The target is painted black, having in mind that the sign must be visible when the ground is covered with snow. It must also be of sufficient height to show above the snow.

The most economical sign is one that can be left in place permanently and requires the minimum of maintenance, that is, an occasional painting to maintain the visibility of the sign, although the shape should be so distinctive that its meaning will be unmistakable, regardless of painting or color. The signs should be erected during the summer, or at least prior to the first snow, by the track forces and then left in place permanently. In all cases they should be set at a uniform distance ahead of the obstruction they are to protect, and this distance should be sufficient to permit the raising of the plow before the obstruction is encountered. Generally, 150 ft. from the obstruction is sufficient, and the sign should be on the right-hand side as the obstruction is approached.

It is considered more economical to leave the sign in place than to remove and store it during the summer. For this reason, it should be of such construction that, if left in place, the maintenance will be less than the cost of taking it down and resetting it,

and by leaving it up the difficulties with storing are eliminated. There is the further possibility that if the signs are removed, they will not be reset in the correct places in all cases before the next winter. If left in place, this danger is not encountered, and all that is necessary is to check the line to insure that no new obstructions to the operation of snow plows or flangers have been put in and that, if they have, they are protected by signs.

### Should Be Portable

By Roadmaster

Since flanger signs perform no function during the warm months, they should be taken down as soon as winter has passed. This means that they should be light in weight and easily portable. The section forces should be held responsible for their erection, removal and storage. Few sections require very many flanger signs so that it is usually satisfactory to store them in the section tool house. While for appearance sake and to protect them from deterioration it is desirable that they be kept painted, this need not be in color or panel design. All that is wanted is a strong contrast with the snow, and this will be obtained by plain black.

Obviously, since the sign should be removed at the end of the winter season, stored during the warm months and re-erected as winter approaches, it should be strong as well as light. These characteristics can be obtained by using light structural-steel angles and riveting or welding a blade to this standard, in the upper quadrant, at an angle of 30 to 45 deg. with the horizontal. Above all else, however, a flanger sign should be distinctive, that is, it should differ in appearance from all other signs and signals.

## Using Second-Hand Lumber

*To what extent can second-hand material be used in building construction and maintenance? What are the advantages and disadvantages?*

### Uses It Regularly

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

During the last 10 years there has been such a pronounced and persistent recession in business that many of the buildings that were essential under former traffic requirements are not needed now and it is, therefore, uneconomical to maintain them. A building that is neither occupied nor maintained deteriorates rapidly, so that we have found it to be advantageous to eliminate them. Most of them are at outlying points, and they include station and auxiliary buildings and company dwellings. In general, the latter have been abandoned as a result of the consolidation and extension of track sections, making it necessary to establish headquarters at new points. A large number of these frame buildings were in good condition and had been well protected with paint, since our maintenance standards were high and had been supervised closely.

In making these changes it became necessary to construct new living quarters for section foremen and laborers, as well as bridge tenders. Many of the buildings that were constructed for this purpose were built entirely of material salvaged from the structures that had been retired and dismantled. In some cases we used prepared roofing and this was new; in others we reused salvaged asbestos shingles, but placed new slater's felt under them. At present we have under construction a four-room bridge tender's dwelling, as shown in the illustration, in which all of the material will be salvaged from retired dwellings or small stations, except the flooring, the felt roofing and the building paper.

**A Bridge Tender's Dwelling Built Entirely of Second Hand Lumber**

For six years, in addition to the foregoing construction, we have been able to carry out almost all of our building maintenance, particularly the greater number of our smaller buildings, through the use of this salvaged material. Obviously, however, the extent to which any class of salvaged material can be used in construction or maintenance will depend quite largely, if not entirely, on the care that is exercised in the removal of the material during the dismantling operation. After considerable experience in dismantling a large number of structures of various types, I can see no good reason for damaging well-preserved siding, boxing, doors, windows, door and window frames or asbestos shingles when dismantling a building.

Ordinarily, flooring can be removed with little damage, or it can at least be kept suitable for reuse as subflooring. Box material can be used as sheathing. When removing flooring, ceiling and siding, an 18-in., thin-bladed, chisel should be employed to cut the nails. This will eliminate the damage that is so likely to occur when the material is pried loose from the supporting rafters and joists.

The foreman must be sufficiently interested in his work to be watchful about the elimination of damage to the material he is salvaging. In this connection we find it to be of advantage to employ the same foreman and gang to dismantle the old building, that are to construct the new facility. It is obvious that if the foreman knows he will be expected to use the salvaged material he will be more interested in preventing damage as it is being taken out of the old structure than he probably would if he knew that some one else was to use it. In this way it is no problem to save at least 96 per cent of the asbesto shingles and 90 per cent of the entire superstructure.

Among the advantages are the saving in cost of the new material that would be needed otherwise, and the saving of some part of the transportation costs, while there is a saving in labor cost by reason of eliminating the need for framing, provided the material is sorted in matched lengths. About the only disadvantage is the labor involved in the removing of nails, but this is a small item, particularly when done by laborers.

An item not to be ignored is the fact that most of the material recovered from buildings constructed from 15 to 20 years, or longer, ago is of better quality than we are receiving today, and where maintenance has been good, the old material is better than new material.

### Too Valuable to Waste

By Supervisor of Bridges and Buildings

Today, lumber is so high-priced and so hard to get that no one can defend the waste of a single stick that is suitable for further use. In making this

statement, I am not advocating the use of scrap material or the application of material that is unsuited to any structure. Until recently building lumber has been so plentiful that most of us rarely thought of the practicability of preserving material for other use when dismantling a building that had been retired, or of using the care necessary to preserve it.

Generally, when a structure was to be razed, especially if another building was to be erected on the site, we were urged to get it down with the least expenditure of time. Naturally, not much of the frame and practically none of the woodwork was salvaged. I recall being assigned the task of dismantling a very large structure built almost wholly of clear white pine. It was well preserved and there were several hundred 12-in. by 12-in. posts varying from 6 to 40 ft. long. I proceeded to save this material but was severely criticized for spending the time necessary to do so. After this, I simply pulled the frame apart with a locomotive crane and loaded the material out to a car-dismantling track where it was unloaded and burned, for it was split and broken beyond further use. If we had been allowed to salvage this material, which could not have been replaced for more than $100 per M. ft. b. m., there would have been a net credit instead of a charge to the job. Time was not an essential element in this case, for the site remained idle for 60 days after we finished.

I cite this instance to illustrate the viewpoint to which the building forces have been educated. We must do it differently in the future, for money is too scarce to permit wasting material that can be made usable. If only a little care is exercised, most of the material from buildings that have been maintained properly can be reused, and should be by all means. With proper care, 80 per cent of the material can be salvaged from any building and it should average as much as 90 per cent for a group. Obviously this does not include enginehouses and other buildings in which the wood members have been damaged by locomotive gases.

# When to Shop Motor Cars

*Is it practicable to fix the interval between the shoppings of motor cars? Why? What determines the interval?*

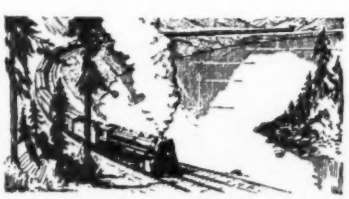
## It Is Not Practicable

By C. L. Fero
Supervisor of Work Equipment, Boston & Maine, Boston, Mass.

It has been my observation over a number of years that it is not practical to fix the interval between shoppings of track motor cars. On this road the assignment and use of the car generally govern the shopping interval. Certain cars in high mileage service and others in incompetent hands may require shop attention twice as often as cars that receive less or less abuse. I am in favor of the engine-exchange policy. Assuming that a foreman endeavors to keep his new car or shop-conditioned car in first-class operating condition; that he keeps it well lubricated and makes a weekly inspection to insure against loose bolts, loose nuts, etc.; this car should remain in service for two to three years without going to the shop. In the meantime, however, a shop-conditioned engine should be installed in the field by the district motor-car maintainer, and the replaced engine should be returned to the shop for attention.

We have sent out new cars of the same model on the same day, for use in comparable section service as to mileage, operating conditions, etc., and have had one of them come back to the shop for overhauling a full year before the other one. In some cases the foreman has allowed the brake shoes to wear until the wooden shoes became badly worn, necessitating the replacement of the complete shoe instead of only the cast-iron liner. Rail sweeps became badly worn and bent. The loose wheel ran without adequate lubrication and at times it has been necessary to replace the hub, bushing and axle.

If a person to whom a car is assigned sees that the bolts, nuts, etc., are tightened periodically and that the unit is lubricated properly on a time schedule, the running gear and chassis should not require a shop overhauling. If an engine is installed in such a car in the field, any car should give satisfactory service for, say, three years after this exchange has been made.



Obsolescence should be given a prominent place in any motor-car repair program, for undoubtedly many old cars have been repaired and retained in service during recent years that should have been retired and replaced with modern equipment.

## Cannot Be Done

By District Engineer

I know of no way by which one can determine a fixed interval for shopping motor cars. Leaving out of consideration the damage that occurs in accidents, which should be nearly negligible, no two cars receive the same treatment, and cases can be cited on any road where the treatment under supposedly similar conditions of service differs widely. Sometimes I think we expect too much from our foremen; that is, the accounting department demands perfect bookkeeping; the operating department requires familiarity and compliance with a long list of operating rules; the safety organization insists on good judgment and constant supervision over the actions of the individuals that make up the gangs. This list could be extended, but is sufficient to show that foremen are expected to be expert in fields that are otherwise considered to be specialties.

Primarily, the foreman is employed because of his knowledge of and ability to construct and maintain track. While the other requirements are important and cannot be ignored, they are secondary to this main purpose of the foreman's work. Obviously, if a man is a good trackman he must have some mechanical ability, and we naturally expect him to have sufficient of this ability to enable him to keep a motor car in tip-top condition. I have observed, however, that in a group of foremen who are substantially on the same level with respect to their ability to maintain track, there will be a wide diversity in their possession of other talents. For instance, one will rarely have personal injuries in his gang, while another will have men hurt every little while; one will keep a fine set of books and his reports will all be in order, while it will be difficult to interpret the books and reports of another.

In the same way, with the best intent in the world, one foreman will wear out his car much sooner than his neighbor. Not infrequently, although his inspection and maintenance are strictly in accordance with instructions, the condition of his car currently is always below that of his

neighbor who, to all appearance, expends less effort to keep his car in running order. To my mind these facts, that are known to every maintenance officer and motor-car repairman, show rather conclusively that the same fixed interval between shoppings cannot be applied arbitrarily to all cars. It has also been my observation, which I am sure will be borne out by any motor-car repair shop, that when cars are sent in, the amount of work they require differs widely.

Substantially all of the roads that maintain independent motor-car and other work-equipment shops, also have a force of field repairmen who are or should be entirely familiar with the condition of the motor cars under their jurisdiction. They are, therefore, in position to say when a car should be sent to the shop, and I believe that this is the proper basis for determining the shopping needs for motor cars. Incidentally, the system of exchanging engines at the proper intervals that is in effect on a number of roads, will not only increase the service life of the engines, but will tend to keep the motor car as a whole out of the shop much longer than where this practice is not in effect.

# How to Lay Brick Platforms

*What are the relative merits of the various patterns to which brick is laid in station platforms?*

## Lay at an Angle

By Frank R. Judd
Engineer of Buildings, Illinois Central, Chicago

Passenger platforms having the bricks laid on edge in the herringbone pattern, that is, at an angle of 45 deg. with the curb, are the more desirable. Experience has shown that bricks laid to this pattern wear better under trucking and make a smoother platform for trucking, since the metal tires of the trucks do not strike the edges of the bricks at a right angle. It is also the most pleasing pattern.

A brick platform can also be laid to this pattern with the bricks laid flat instead of on edge, thus using fewer bricks and making a saving in both the material and the labor of laying. However, bricks that are laid flat are more apt to break under trucking.

Bricks that are laid on edge at right angles to the curb make a very satisfactory job, but are not as smooth for the operation of trucks. Also, because the truck wheels generally strike them at right angles, they are more apt to chip and wear on their edges. Bricks laid flat and at right angles to the curb do not make as smooth a platform for trucks and are more apt to break under heavy truck loads. Bricks that are laid at right angles to the curb give one advantage, namely, the platform can be extended without taking up any of the old platform for dovetailing purposes.

In any event, regardless of the pattern to which the bricks are laid, it is absolutely necessary to have a level, well-rolled or tamped subgrade upon which to lay the brick to insure against future settlement. The sand cushion should be about 2 in. thick, should be laid even and smooth, and should be rodded or dressed to the contour of the finished platform.

## Why Use Brick?

By Supervisor of Bridges and Buildings

I think that no one will dispute the statement that the wooden platform is completely out of date for passenger purposes, although an astonishing number of them are still in service. From my point of view, while a brick platform has a much higher degree of permanence than the wooden structure, it is almost as completely outmoded. In saying this I am aware that the brick platform is likely to continue in favor for many years to come, but I think this is largely because it is a human characteristic to be conservative about changing old ideas for new ones.

I prefer concrete as a material for station platforms for several reasons, among them the maximum of smoothness for trucking and walking, and almost complete absence of maintenance. The only serious objection I have ever heard raised to the installation of concrete platforms is the absence of salvage in the event the track or station facilities are revised. Obviously, if such changes are imminent, it would be foolish to install either concrete or brick, but when a brick station is built it is equally obvious that the objection is not valid. As proof, I can point to a number of station platforms that were built despite this objection, that have been in service from 25 to more than 30 years, and which are still in good condition.

To return to the question, however, the brick for a platform should never be laid flat, but always on edge, and should be rolled smooth after installation. If there is any amount of trucking over the platform, the brick should not be laid at right angles to the curb along the track, but at an angle of 45 deg. to it. Any pattern that will meet this requirement is satisfactory and, so far as I have observed, has no special merit over any other that also meets it. The reason for this is that most of the trucking over a station platform parallels the track and the 45 deg. angle provides a much smoother trucking surface, and reduces the damage from chipping and abrasion of the brick.

# Satisfactory Highway Crossings

*What are the principal requirements of a satisfactory highway crossing? Which types meet these requirements?*

## Safety Is First

By T. M. Pittman
Division Engineer, Illinois Central, Water Valley, Miss.

Most important, a highway crossing must be safe. This does not refer to the view or surroundings but to the crossing structure itself. From the viewpoint of highway traffic, this is about the only requirement and is easily met if the surface is smooth. A rough crossing may cause a driver to lose control of his car, particularly if he is driving at high speed, and accidents have resulted, or it has been claimed that they have resulted, from this cause. From the point of view of the railway it is still more important that the crossing be safe.

Again, a satisfactory crossing must be durable, easy to repair and easy to remove to permit working the track. It must be so constructed that dragging equipment will not tear it out. It must also be well drained so that freezing will not cause it to heave or be broken; and it should have flangeways that are easy to keep clean, particularly in sections where snow and ice are common.

It is no easy matter to design a crossing that will meet all of these requirements satisfactorily, and most of those available fall short in one or more particulars. Regardless of the type of crossing involved, the most important consideration is the preparation of the track and subgrade before the crossing is installed; the track should be prepared carefully on a fresh bed of well drained ballast, and every tie within the limits of the crossing should be renewed. If the rail is worn, it should be renewed also, and no joints should be allowed in the crossing. It is desirable to have this preliminary work done beforehand, that is, to have the track run under traffic for several days and then given a final surface immediately before the crossing is installed. Among the types of crossings in common use are wood plank, concrete slabs, solid concrete, cast iron and cast steel, rolled steel, old rails and some forms of bituminous cold-mix material. While wood planks are satisfactory when new, many species wear rapidly under traffic or, if untreated, decay quickly. If they are well and carefully maintained, the eventual cost is not much less than some of the other types. Objection has been raised to steel crossings because they become slippery, especially when wet and are not suitable for horse-drawn traffic. On the other hand, they can be removed easily to permit track repairs, as can concrete slabs. Most of the others have much to commend them and some objectionable features, but all will answer admirably in most situations if they are installed properly and maintained carefully.

### Two Are Essential

By Roadmaster

Among the requirements of a crossing, two characteristics are essential, that is, it must be smooth and it must have traction. A crossing that is not smooth may be extremely hazardous, especially where automobiles and trucks are accustomed to proceed at high speed. One that is slippery may be still more dangerous under some circumstances. Obviously, it is equally important that a crossing be as safe for railway traffic as for highway traffic, for which reasons the provisions for fastening it down and for preventing damage by dragging parts of equipment must be adequate to prevent movement, even under unfavorable conditions. Closely connected with these requirements is adequate drainage to insure against heaving.

Permanence is as desirable as any other feature, but at the same time the crossing should be of such design that it can be removed easily to allow work on the track. Most wooden crossings do not meet any of these requirements, except ease of removal and good traction. Recently, treated black gum has been employed to advantage in all respects. Other crossings that meet these requirements are cast iron and steel, concrete slabs and a few designs of rolled steel. It is essential, however, that the crossings be installed properly and that they be given careful maintenance.

## Water-Service Stocks

*To what extent should the division organization be advised of the stock of water-service materials carried at district and general storehouses? What are the advantages?*

### Should Know Fully

By Engineer of Water Service

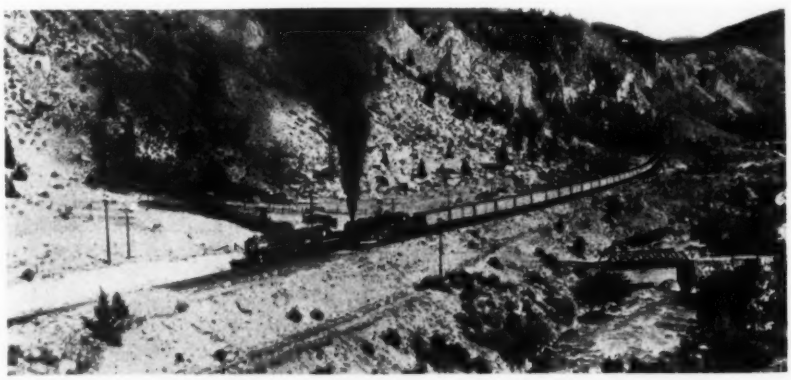
Division water-service forces should know what items of materials are carried in stock normally at both general and local storehouses. If the materials that they use currently are not stocked, the engineer of water service should be advised and he should see that an adequate stock of such materials are made available. In this way there will be no excuse for the local forces to order or hold any of these materials beyond their current needs, a practice that is hard to control where needed items are difficult to obtain, or where there is generally a long interval between requisition and delivery. Extremely serious consequences in the way of delays to trains may flow from failure to obtain needed material in case of a breakdown at a water station, especially if it is an important point of water delivery.

In general, stocks can be regulated as to volume by the record of the movement of the stock over a suitable period. In the water service, however, some items are rarely called for except in emergencies but may be needed acutely at such times. For this reason, the stores department should never discontinue or reduce its stocks of such materials without consulting the water department.

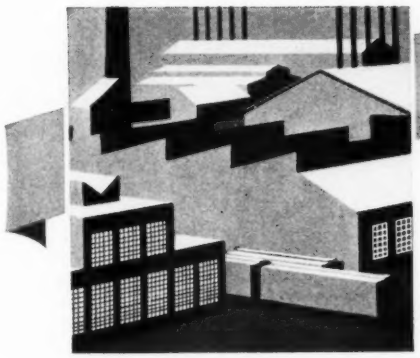
### Should Be Advised

By Inspector of Water Service

With some kinds of materials it makes little difference whether the user has any knowledge of the operation of the stores department with respect to them. In other words, it is so seldom that they become emergency items that it is a matter of indifference whether the stores department keeps them in stock or whether requisitions are filled by shipments direct from the manufacturer. Water-service materials do not fall into this category, for a dependable water supply is so important that practically all classes of water-service materials may become emergency items at almost any moment. It is wholly undesirable for the division water-service forces to carry a stock of material beyond their immediate needs, but unless they know that their requirements will be filled promptly by the local storehouse, they are almost compelled to do so to protect themselves.



**The California Fast Freight of the D. & R.G.W., Westbound, Near Princeton, Colo.**



# PRODUCTS of Manufacturers

## Single-Phase Vertical Pump Motors

FAIRBANKS, Morse & Co., Chicago, has placed on the market a new line of vertical single-phase pump motors in sizes ranging from ¾ to 5 hp., designed for pumps of small capacity ranging up to 100 gal. per minute at heads of 70 ft. These motors are adapted particularly for use with shallow well pumps, sump pumps and similar applications of vertical centrifugal pumps and turbine and ejector pumps in bridge and building work.

The motors are designed to operate at 1,200, 1,800 and 3,600 r.p.m. The 1,800 and 1,200 r.p.m. motors are the repulsion-start induction-run type, and are provided with a centrifugal device that, at a predetermined speed, short circuits the entire commutator, allowing the motor to come up to speed and operate as an induction motor. The motors designed for a speed of 3,600 r.p.m. differ in that they do not require a short circuiting device in the armature. These motors start as repulsion motors, and, as the speed increases, the squirrel-cage winding in the rotor picks up a large portion of the load automatically.

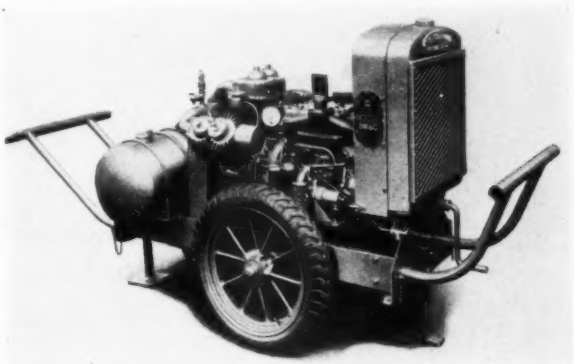
The coil windings are well insulated with a heavy-bodied, permanently-pliable compound selected for its moisture, oil and acid-resisting qualities, and it is said that dripping or splashing water will not harm the motors under normal operating conditions since the design prevents the water from reaching vital parts.

The motors are available with solid or hollow shaft modifications. The solid shaft units are usually direct-connected to the pump by a flexible coupling. The hollow shaft type of construction is said to be adapted especially to vertical pump installations and to provide easy and convenient installation, since the pump shaft extends up through the motor shaft and is held in place by adjustable lock nuts above the upper motor bearing, which is designed to support the entire thrust load of the shaft, rotating parts of the pump and the load imposed by the column of liquid being lifted. A two-jaw clutch is also provided, which disengages the motor from the pumps if the motor should be connected accidentally for reverse rotation, thus protecting against accidentally unscrewing the pump shaft.

**Two Types of the New Line of Pumps, Which Are Designed for Capacities up to 100 Gal. per Min. at Heads of 70 Ft.**

## Ingersoll-Rand Portable Compressor

THE Ingersoll-Rand Company, New York, has introduced a new portable two-stage air compressor, known as Model DR-60, which is designed especially for railroad service. This unit, which is the smallest two-stage air-cooled compressor built by this company, is constructed along the same general lines as this company's larger portables. It is designed to deliver 60 cu. ft. of free air per minute at a discharge pressure of 100 lb. per sq. in., and it is said that it will furnish more than enough air to operate four tie tampers and a cribbing fork at the same time.



**The New Ingersoll-Rand DR-60 Portable Compressor Weighs 1,000 lb.**

The new compressor, which weighs 1,000 lb., is mounted on two roller-bearing wheels with pneumatic tires. It has a push handle and stabilizers at each end, and is equipped with a turtle-back cover to protect the compressor and engine from the weather and to provide a means of locking the wheels against theft. It is said that this unit is well balanced, that it can be easily rolled along beside the track

as the work progresses and that it may be used for operating many combinations of other air tools.

## Model-F Ozalid Whiteprinting Machine

THE Ozalid Corporation, Johnson City, N. Y., has developed a new Model F Whiteprinting machine, which combines all the facilities necessary to produce finished dry-developed Ozalid Whiteprints in less than two minutes. This machine, which occupies only 14 sq. ft. of floor space, is similar in design and operation to the Model A Whiteprint machine that was described on page 186 of the March issue, but is smaller in size and capacity, being designed to fill the need for a fast machine of moderate size.

The Model F employs a new type high pressure mercury vapor lamp with an output of 40 watts per inch and an active length of 46 in., which

**The Model F Occupies Only 14 Sq. Ft. of Floor Space and Produces Finished Whiteprints in Less Than Two Minutes**

allows printing speeds ranging up to 56 in. per minute. The lamp is guaranteed for 1,000 hours and is said to have a life of from 1,500 to 2,500 hours. Furthermore, burnt-out lamps can be reworked with a considerable saving, as compared to the purchase price of a new lamp.

## Reversible Wrenches in Three New Sizes

THE Chicago Pneumatic Tool Company, New York, has added three new units to its line of pneumatic reversible wrenches of the "power vane" type. The new wrenches are known as the 344-R, the 349-R and the 360-R, and have bolt size capacities of ⅜ in., ⅝ in. and ¾ in., respectively. Substantially similar to each other in design and construction, these wrenches have pistol-type grips and, like other reversible wrenches manufactured by this company, they are each powered with a slow-speed rotary motor and have springless driving units.

The type 344-R has an over-all length of 6½ in., a ⅜-in. square shank, and a net weight of 4¼ lb.,

**The Type 344-R Reversible Wrench of the Chicago Pneumatic Tool Company.**

while the 349-R is 9¾ in. long, has a ½-in. square shank and weighs 9½ lb. The 360-R, the largest of the three, has an over-all length of 10 in., a ¾-in. square shank, and weighs 13 lb. Standard equipment furnished with each wrench includes a socket for hexagonal nuts and 8 ft. of 5/16-in. air hose with fittings.

## Improved Floor Finish

THE Flexrock Company, Philadelphia, Pa., has improved its Glasflex floor finish to the point where this material is now said to be completely resistant to acids, alkalis and fire. This product, which is adaptable to use on wood and concrete floors, counters, table tops and similar locations, has heretofore been known to be resistant to minor acids and heat, although before being improved it was affected by extreme alkalinity and acidity.

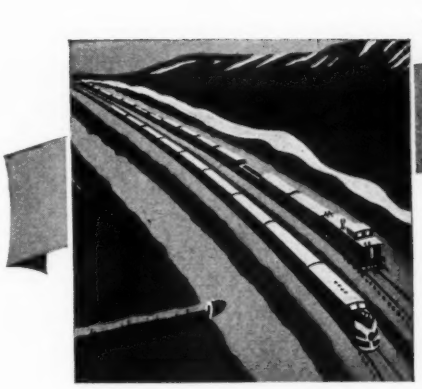
It is claimed that if a dried film of the improved Glasflex is removed from tin and placed in acid and then in alkali it will not be affected in the slightest degree. In a test of the improved product, a quantity was spread on tin, thoroughly dried in a high temperature, removed and then tested by submerging it in such fluids as concentrated sulfuric acid, a 50 per cent solution of sulphuric acid and water, carbolic acid and total alkalinity (sodium hydroxide). Also, a coat of the material on tin was covered with alcohol which was ignited and allowed to burn out completely. It is claimed that not even the gloss of the material was disturbed in any of the tests.

## New Tampair Has More Capacity

A LARGER model of its Tampair compressor, an off-track unit designed especially for spot-tamping purposes, has been introduced by Schramm, Inc., West Chester, Pa. The new unit, which is known as Model 60, delivers air at the rate of 60 cu. ft. per min., and replaces the previous model which had a rate of 55 cu. ft. per min. Besides operating four tamping tools at one time, it is said that the new model will operate a heavy-duty paving breaker, a rock drill, rotary drills, or paint spray equipment.

Briefly, the new Tampair consists of a four-cylinder Mercury V-type compressor powered by a four-cylinder V-type engine of the same make, the entire unit being mounted on two wheels with pneumatic tires. Standard equipment includes a pair of handle bars at one end of the unit and two flanged rollers which permit the machine to be moved along on the rails. As extra equipment, a protective hood and an additional pair of handle bars are available. Without the hood, which weighs 40 lb., the machine has a weight of 960 lb.

**The New Schramm Model 60 Tampair Compressor Delivers Air at a Rate of 60 Cu. Ft. per Min.**



# NEWS of the Month

## 1,175,243 Tons of Rails Rolled in 1939

According to a report of the Department of Commerce based on the preliminary report of the 1939 census of manufacturers, rails, including rerolled or renewal, reached a production in that year of 1,175,243 long tons, compared with 1,440,324 long tons in 1937. Their factory value was $48,161,910 as compared with $55,070,528 in 1937. Rail joints and fastenings, tie plates, etc., increased in tonnage from 459,966 to 461,982, with a rise in value from $23,750,579 to $25,159,082. Rails, rail joints and fastenings, and car and locomotive wheels made last year in steel works and rolling mills had a total value at the factory in excess of 86 million dollars.

## Eastman Urges a Permanent Board Outside of the I. C. C.

In an address before the Transportation Club of Buffalo, N.Y., on November 12, Joseph B. Eastman of the Interstate Commerce Commission discussed the provision of the Transportation Act of 1940 providing for a board of investigation and expressed the opinion that it will be found necessary and desirable to create a permanent board on transportation outside of the I. C. C. to act as an advisor to government agencies, to study the broader phases of the transportation problem and to formulate the policies with respect to the broader phases of regulation, taxation, etc. Such an agency, not burdened with the mass of regulatory duties carried by the I. C. C., would be equipped to continue such studies and "would be available at all times for advice and help, not only to the President and Congress, but also to the carriers and shippers."

## Unemployment Benefits Increased on November 1

Increases in benefit payments under the Railroad Unemployment Insurance Act under amendments passed by Congress and signed by the President on October 10, were made effective November 1. Under the amended law an eligible unemployed railroad worker will be paid for every day of unemployment in excess of four in a period of 14 consecutive days, instead of every day in excess of seven in a period of 15 consecutive days as formerly. The daily payments have been increased from $2.50 to $3.00 for workers with annual wages of $1,000 to $1,024, from $2.75 to $3.00 for workers with annual wages of $1,025 to $1,299, from $3.00 to $3.50 for workers with annual wages from $1,300 to $1,599, and from $3.00 to $4.00 for workers with annual wages of $1,600 or more. The number of days for which a worker may draw benefits is increased from 80 days to a maximum of 100 days a year. The maximum amounts of benefits per year, which originally ranged from $140 to $240, depending on the earnings in a preceding calendar year, will now vary between $175 to $400.

## F. B. I. Issues Booklet on Guarding Against Sabotage

A booklet on espionage and sabotage entitled "Suggestions for Protection of Industrial Facilities" has been prepared by the Federal Bureau of Investigation. The booklet, which is confidential in nature, will be distributed to the heads of law enforcement agencies and to executive officials of industrial concerns manufacturing defense materials under government contracts. In a letter to the Associated Business Papers, Inc., dated October 31, concerning the booklet, J. Edgar Hoover, director of the F. B. I. stated in part, "the first and final responsibility to give speed and strength to our national defense program by protection against espionage and sabotage lies with industry itself. Only through the energy and alertness of its officials and workers will the full measure of preparedness be attained . . . because of its confidential nature this booklet is limited in distribution . . . a copy will be furnished an industrial concern upon the written request of an executive official.

## Transportation for National Defense or War?

In an address before the annual meeting of the National Shippers Advisory Boards at Chicago on October 30 and 31, C. H. Buford, vice-president of operations and maintenance of the Association of American Railroads, intimated that the demands on transportation would be small or great, depending upon whether we are preparing for defense or war. "We started out a few months ago," Mr. Buford said, "with the idea that we were embarking upon a program of strengthening the defense arms of this country so we could protect ourselves from aggression. As time passes and as our orders pile up for future delivery of war supplies and battleships, there appears to be evidence of a change in sentiment, and we now wonder if instead of preparing for defense, we are preparing for war in the immediate future.

"We hope time will permit our carrying out the program as originally planned, but in either event, adequate transportation is the most important part of the program. . . . The adequacy of transportation, so far as the railroads are concerned, will be limited only by their ability to estimate properly the future business to be moved. If we knew what the load would be, it would be a very simple matter to provide for it. . . . After assembling all the data we have been able to get and doubling it to allow for a possible increase in general business, it looks like a weekly increase in loading of about 8 per cent.

## Ralph Budd Discusses Future of the Railways

In an address at Aurora, Ill., on October 21, at the celebration of the 90th birthday of the inauguration of railway service between Chicago and Aurora, Ralph Budd president of the Chicago, Burlington & Quincy and transportation member of the National Defense Advisory Commission, discussed the future of the railways, in which he said in part, "My misgivings about the future of the railroads are not based upon fear that they will cease to be essential as a most important part of the nation's transportation system. . . . The railway's trouble is financial; their inability to earn a return on the investment. . . . Financial success or failure bears more on the question of how railway transportation shall be furnished in the future; whether by private enterprise, as in the past, or by government ownership and operation, or, as has been the tendency in recent years, by private management but with the confiscation of railway values through bankruptcy and reorganization on a basis which contemplates continued use of the properties for public purposes without permitting them to earn a fair return.

"The public has a great stake in the future of the railways. It may be said that the manner in which their operation is carried on is of relatively small importance since the properties are in existence and will continue to give service, but I do not agree that the sacrifice of private ownership is a small matter. Even if government operation would give as good service, which I do not for one moment believe, the administering of the transportation of the country in such a way as to make an end of private operation of railroads would certainly lead to similar action in other fields."

# Association News

### Railway Tie Association

At a recent meeting of the Executive committee, it was decided to hold the next annual convention in Chicago in May, 1941, the exact date to be determined by the Executive committee at a meeting to be held in January.

### Roadmasters' Association

President John J. Clutz has called a meeting of the Executive committee in Chicago on December 7 to appoint committees and otherwise organize the work of the association for the next year. Preliminary to this meeting, Secretary Whiteman has sent a questionnaire to members asking their preference for committee assignments.

### Bridge and Building Association

Secretary Whiteman has sent a questionnaire to the members of the association, listing the subjects selected for committee consideration during the ensuing year and asking for volunteers for committee service. The returns to this questionnaire will be presented to the Executive committee at a meeting which President Church is preparing to call in Chicago on Monday, December 9, to appoint these committees and to organize the work for the year.

### Metropolitan Maintenance of Way Club

The next meeting of the club will be held at the Hotel Governor Clinton, New York City at 12:30 p.m. on December 12. Following luncheon, the meeting will be addressed by Col. A. L. Bartlett, engineer maintenance of way of the New York, New Haven & Hartford, who will describe the experiences of his company with the stripwelding process for building up rail ends. Also, as an additional feature of the program there will be a demonstration of the Polariscope, a device by means of which stress patterns of loaded structural members are determined by passing polarized light through transparent plastic models. In the demonstration, models of track materials will be used as the specimens.

In scheduling this meeting for December 12, the club is following its usual practice of holding its December meeting on the same day as the annual evening dinner of the New York Railroad Club.

### Maintenance of Way Club of Chicago

One hundred forty-eight members and guests attended the meeting on November 25, when the club was host to five officers of the Rio Grande do Sul Railway of Brazil, including the director general, the assistant director general, engineer track division, engineer locomotive division and chief, shops division, who are in the United States incident to the purchase of equipment and track materials for their railway. The Director General, Dr. Octacilio Pereira, addressed the meeting on Maintenance Practices in Brazil, with particular reference to the Rio Grande do Sul, the 2100-mile, government-owned and operated road in the southern part of the country.

The next meeting of the club, which will be held on December 16, will be addressed by F. S. Hewes, office engineer, Atchinson, Topeka & Santa Fe, on Why A Longer Tie, bringing out the considerations which led the Santa Fe to adopt a 9-ft. tie for its main tracks between Chicago and Los Angeles.

### American Railway Engineering Association

During November, Bulletin 420, including the reports of the committees on Economics of Railway Location and Operation, Electricity, Uniform General Contract Forms, Waterways and Harbors, and Standardization, was mailed to the members of the association. In addition, four committees and the Board of Direction held meetings, the committees including those on Records and Accounts, at Indianapolis, Ind., on November 7 and 8; Ties, at Kansas City, Mo., on November 7 and Galesburg, Ill., on November 8; Rules and Organization, at New York, on November 14; and Impact, at Chicago, on November 26. At the meeting of the Board of Direction at New York on November 15, C. E. Smith, vice-president of the New York, New Haven & Hartford, was elected a director for the term ending March, 1942, to fill the vacancy created by the death of Robert Faries, assistant chief engineer, maintenance, Pennsylvania. At the same meeting, the committees on Stresses in Railroad Track and on Clearances, which have functioned as special committees for many years, were made standing committees, and will be assigned specific numbers.

During the month appropriations authorized by the Association of American Railroads for carrying on during 1941 the work of certain A.R.E.A. committees making special investigations or studies, were announced as follows: Transverse fissure investigation, $9,000; stresses in track, $18,000; tests of joint bars, $3,500; tests of manganese frogs, $1,000; impact studies, $11,500; fatigue tests of structural welds, $5,000; and tests of asphalt and coal tar pitch, $500. In addition, $32,000 was appropriated for carrying out the Engineering Division phases of the locomotive counterbalance investigation that is being conducted by a joint committee of the Mechanical and Engineering divisions.

All of the reports to be included in Bulletin 421 are in the hands of the secretary, and this bulletin will be mailed to members during the latter part of December. This bulletin will include the reports of the committees on Buildings; Highways; Water Service, Fire Protection and Sanitation; Yards and Terminals; Economics of Railway Labor; Co-operative Relations with Universities; and Maintenance of Way Work Equipment.

With the year's work of committees either completed or drawing to a close, only three committees have scheduled meetings during December. These committees include those on Water Service, Fire Protection and Sanitation, at New York, on December 2; on Track, at Chicago, on December 5; and on Rail, at New York, on December 11.

# Personal Mention

## General

**John A. Bryan,** trainmaster-roadmaster on the Rocky Mountain division of the Northern Pacific, has been appointed trainmaster on that division, and **William A. Bracken,** division roadmaster, with headquarters at Spokane, Wash., has been promoted to trainmaster-roadmaster, with headquarters at Missoula, Mont., succeeding Mr. Bryan.

**Christopher T. Sponsel,** assistant superintendent of the Lake Superior division of the Northern Pacific, with headquarters at Duluth, Minn., and an engineer by training and experience, has been promoted to division superintendent, with headquarters at Glendive, Mont. Mr. Sponsel was born in Chicago on March 31, 1887, and studied civil engineering at the University of Illinois from 1906 to 1909. He entered railway service in June, 1906, in the engineering department of the Northern Pacific during his summer vacation from the university. He worked in the same department the following two summers, and continued in 1909, serving as a chainman, rodman and resident engineer on construction in North Dakota and Montana until 1913, when he was promoted to roadmaster at Mandan, N. D., later being transferred to Helena, Mont. In 1918, he was promoted to trainmaster and served in that capacity at Mandan, Forsyth, Mont., and Dickinson, N. D., until May, 1929, when he was advanced to assistant to the general superintendent of the Eastern district, with headquarters at St. Paul, Minn. Mr. Sponsel was appointed assistant superintendent of the Lake Superior division, with headquarters at Duluth, on September 1, 1930, the position he held until his recent promotion.

**C. E. Whitlock,** general superintendent of the Southern division of the Pennsylvania, with headquarters at Wilmington, Del., and an engineer by training and experience, has been promoted to assistant to the general manager of the Eastern region, with headquarters at Philadelphia, Pa., and **John T. Ridgely,** superintendent of the Columbus division at Columbus,

C. E. Whitlock

Ohio, and also an engineer by training and experience, has been advanced to general superintendent of the Southern division succeeding Mr. Whitlock.

Mr. Whitlock was born at New Brunswick, N.J., and was graduated from Rutgers College in 1899. He began his railroad career on May 1, 1901, as a laborer in a track gang on the New York division of the Pennsylvania. He served successively in various positions, including rodman, transitman, assistant supervisor, supervisor, assistant trainmaster, trainmaster and freight trainmaster until October 24, 1923, when he was promoted to superintendent of the Erie & Ashtabula division, at New Castle, Pa. He was later transferred to the Eastern division, at Pittsburgh, Pa., and to the Pittsburgh division. He became general superintendent of the Southwestern division, at Indianapolis, Ind., on May 16, 1928, and was transferred to the Southern general division, with headquarters at Wilmington, on June 16, 1929.

Mr. Ridgely was graduated in civil engineering from Lehigh University in 1909,

**John T. Ridgely**

and entered railroad service as a rodman on the Pennsylvania at Baltimore, Md., on August 12, 1909, engaging in construction work in connection with the present station and track lay-out at Baltimore. On completion of the Baltimore Improvements, Mr. Ridgely served as a rodman successively on the old Belvidere division, the Trenton division and the New York division. He was advanced to transitman on May 11, 1914, and assigned to the Philadelphia division, and on January 25, 1915, he became assistant track supervisor on the Conemaugh division at Pittsburgh, Pa., later being transferred to the Delmarva and the Maryland divisions. On September 16, 1918, he became supervisor on the Trenton division and subsequently served as assistant supervisor on the Maryland division from June to November, 1919, when he was appointed supervisor on the Allegheny division. On October 13, 1926, he was transferred to the Eastern division at Pittsburgh. Mr. Ridgely was promoted to division engineer of the Richmond (Ind.) division on January 16, 1927, and the following year became engineer maintenance of way of the Long Island. He was promoted to superintendent of the Indianapolis division on October 16, 1928, and on November 1, 1935, he was transferred to the Columbus division at Columbus, Ohio, the position he held until his recent promotion to general superintendent.

## Engineering

**Troy West** has been appointed engineer of track of the Union Railroad, with headquarters at East Pittsburgh, Pa.

**Adam Keever,** assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), at Cincinnati, Ohio, has been transferred to the office of the chief engineer of the New York Central, lines west of Buffalo, at Chicago, succeeding **J. L. Cox,** whose appointment as assistant engineer in charge of work equipment, with headquarters at Cleveland, Ohio, was announced in the August issue.

**J. A. Lorch,** valuation engineer of the Chicago & North Western, has been appointed assistant to the chief engineer, a newly created position, with headquarters as before in Chicago, and will handle valuation map work, special matters for tax cases and other work as may be assigned. The position of valuation engineer has been abolished.

**A. N. Reece,** chief engineer of the Kansas City Southern, has been appointed chief engineer of the K. C. S. and of the Louisiana and Arkansas in charge of engineering, new construction and standards, with headquarters as before at Kansas City, Mo., and **E. F. Salisbury,** chief engineer of the Louisiana & Arkansas, has been appointed chief engineer of both roads in charge of maintenance of way and structures, with headquarters as before at Shreveport, La.

**W. H. Miesse,** assistant division engineer on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), with headquarters at Mattoon, Ill., has been promoted to division engineer of the Ohio division, with headquarters at Springfield, Ohio, succeeding **Leigh B. Elliott,** whose appointment as division engineer on the New York Central, with headquarters at Cleveland, Ohio, was announced in the November issue.

**F. W. Creedle,** assistant engineer in the office of the engineer of maintenance of the Chicago & North Western at Chicago, has been promoted to division engineer, with headquarters at Sioux City, Iowa, succeeding **L. R. Lamport,** who has been transferred to the Galena division, with headquarters at Chicago, relieving **E. L. Mead,** who retired on December 1. **P. V. Thelander,** assistant engineer on the Galena division, has been promoted to assistant engineer in the office of the engineer of maintenance, with headquarters as before at Chicago, replacing Mr. Creedle.

The jurisdiction of **George H. Harris,** chief engineer on the New York Central system, with headquarters at Chicago, has been extended to include the territory embracing the Ohio, Indiana and Illinois divisions (the Big Four) and the Peoria & Eastern (another subsidiary road). **Frank J. Jerome,** assistant chief engineer on the New York Central system, with headquarters at Chicago, has also been given additional jurisdiction over the Ohio, Indiana and Illinois divisions, and **Paul Hamilton,** assistant chief engineer of the Cleveland, Cincinnati, Chicago & St. Louis (Big Four) has been appointed district engineer on the New York Central system in charge of the Ohio, Indiana and Illinois divisions, with headquarters as before at Cincinnati, Ohio.

**Royden R. Brockway,** whose promotion to assistant bridge engineer of the Northern Pacific, with headquarters at St. Paul, Minn., was announced in the November issue, was born in Rock County, Minn., on September 17, 1880, and graduated in civil engineering from the University of Minnesota in 1905. He entered railway service on June 17, 1907, as a draftsman in the bridge engineer's office at St. Paul and on November 1, 1910, he was appointed bridge inspector at Superior, Mont. On December 21, 1910, he went with the Illinois Central at Chicago, returning to the Northern Pacific on June 26, 1911, as bridge inspector at Glendive, Mont. In November, 1911, Mr. Brockway

**Royden R. Brockway**

returned to the bridge engineer's office at St. Paul as a draftsman, and on May 20, 1913, he was promoted to chief draftsman, the position he held until his recent promotion, which was effective October 10.

**Lindsley B. Curtiss,** whose promotion to architect of the Northern Pacific, with headquarters at St. Paul, Minn., was announced in the November issue, was born at Medford, Minn., on January 30, 1885, and graduated from the University of Minnesota in 1909. He entered railway service as a draftsman in the bridge engineer's office of the Northern Pacific at St. Paul on December 1, 1911. In 1917, he was promoted to assistant engineer in the office of the valuation engineer and in 1921, he was transferred back to the bridge department. Mr. Curtiss was appointed assistant engineer in charge of bridge construction projects in 1926, and in 1929, he was appointed assistant engineer on the maintenance of structures in the office of the assistant chief engineer, with headquarters at Seattle, Wash., the position he held until his recent promotion.

**Edward E. Kinzel,** whose promotion to division engineer on the Pennsylvania, with headquarters at Cleveland, Ohio, was announced in the October issue, was born at La Fayette, Ind., on July 9, 1904, and

graduated from Purdue University in 1928. He entered railway service on November 5 of that year as assistant on the engineering corps on the Indianapolis division of the Pennsylvania, and, subsequently, was transferred to Lancaster, Pa., and to Wilmington, Del. In September, 1933, he was promoted to assistant supervisor, with headquarters at Downingtown, Pa., and in November, 1934, he was advanced to supervisor of track, with headquarters at Sharon, Pa. In January, 1936, Mr. Kinzel was transferred to Washington, D.C., where he was located at the time of his recent promotion.

**Ernest R. Shultz,** whose promotion to division engineer of the Columbus division of the Pennsylvania, with headquarters at Columbus, Ohio, was announced in the October issue, was born at Somerset, Pa., on October 25, 1903, and attended Pennsylvania State College from 1920 to 1924. He entered railway service in June, 1924, as an assistant on the engineer corps of the E. & A. division of the Pennsylvania, and in 1927 he was promoted to assistant supervisor on the Pittsburgh division. In 1928, he was transferred to the Eastern division and in 1929 he was promoted to supervisor of track on the Cleveland division, later being transferred successively to the Panhandle, Middle, Wilkes-Barre and Philadelphia divisions. Mr. Shultz was located at Lancaster, Pa., at the time of his recent promotion, which was effective September 1.

**James F. Mark,** chief clerk in charge of engineering of the Detroit & Mackinac, has been appointed engineer, a newly created position, with headquarters as before at Tawas City, Mich. Mr. Mark was born at AuSable, Mich., on June 15, 1891, and studied a correspondence school course in engineering. He entered railway service on February 25, 1911, as a car billing clerk on the Detroit & Mackinac at Tawas City. On May 16, 1918, he went to work for the Burroughs Adding Machine Company at Detroit, Mich., in the inspection department. Three years later he returned to the Detroit & Mackinac as a general clerk in the auditor's office and on June 21, 1928, he was promoted to chief clerk of the capital expenditures division. Mr. Mark was appointed chief clerk in charge of engineering on April 16, 1936, the position he held until his recent promotion, which was effective October 1.

**A. D. Ferguson,** construction engineer on the Montreal Terminal development of the Canadian National has been appointed engineer of construction, with headquarters at Montreal, Que., taking over the duties performed by the late **C. S. Gzowski,** chief engineer of construction, whose death on September 7 was reported in the October issue. Mr. Ferguson was born in Cardiff, Wales, and was graduated from the Universities of Oxford and Wales. Upon completion of his courses he came to Canada and in 1911 entered the service of the Grand Trunk Pacific on the construction of the Tofield-Calgary line. Afterwards he joined the Canadian Northern (Ontario lines) and worked on the construction of the Nipigon-Orient Bay section. His next employment was on the construction of the Hudson Bay railway working into Nelson, the original terminus of the route. In November, 1926, Mr. Ferguson joined the Canadian National as engineer in the Bureau of Economics, and with the resumption of

**A. D. Ferguson**

work on the Montreal terminal development, he was appointed construction engineer on that undertaking, the position he held until his recent appointment.

**Loraine Walker Funk,** whose appointment as engineer maintenance of way of the Charleston & Western Carolina at Augusta, Ga., was reported in the November issue, was born on March 4, 1894, at Charleston, S. C. Mr. Funk attended Clemson College, South Carolina, from 1912 to 1914 and was graduated from Alabama Polytechnic Institute, Auburn, Ala., in 1917, with a degree in civil engineering. After serving in the World War he entered railroad service on April 1, 1919, with the Atlantic Coast Line as a rodman on construction work in Florida. In June, 1919, he became an inspector; in August, 1919, an instrumentman and in October, 1919, a draftsman in the office of the chief engineer. Mr. Funk was appointed junior engineer, maintenance of way department in May, 1921, and in September, 1924, became assistant engineer, in the same department. He was

**Loraine Walker Funk**

appointed assistant engineer in the office of the chief engineer in March, 1925, being transferred to the Charleston & Western Carolina at Augusta, in September, 1926, as assistant engineer, valuation and maintenance of way departments, holding that position until October 1, when he was appointed engineer maintenance of way, at Augusta.

**Newton Wells McCallum,** whose appointment as assistant chief engineer of the Pittsburgh & Lake Erie at Pittsburgh, Pa., was reported in the November issue, was born on November 8, 1878, at Renovo, Pa. Mr. McCallum was graduated from Pennsylvania State College in 1899 with a civil engineering degree. He entered railroad service on June 15, 1899, with the New York Central and served until January 1, 1900, as rodman on the Mohawk division. On January 1, 1900, Mr. McCallum was appointed bridge inspector; on April 1, 1902, assistant supervisor bridges; on April 1, 1904, assistant engineer and on March 1, 1905, supervisor of bridges, all on the Mohawk division of the New York Central. From May 1, 1907, to June 22, 1920, he served as supervisor of structures on the Electric division and from the latter date to September 1, 1923, he was division engineer on the Ontario division. He was division engineer on the Electric division and Grand Central terminal, New York Central, from September 1, 1923, until his recent appointment as assistant chief engineer of the Pittsburgh & Lake Erie, effective October 1.

**Andrew B. Underwood,** roadmaster on the Missouri-Kansas-Texas at Parsons, Kan., has been promoted to district engineer, Southern district, with the same headquarters, succeeding **George Monroe Luther,** whose death at Parsons on August 2 is announced elsewhere in these columns. Mr. Underwood was born at Lamar, Colo., on December 27, 1887, and attended Kansas University from 1910 to 1914, entering railway service in June, 1914, on the Kansas City Terminal. Three months later he went with the maintenance of way department of the Missouri Pacific at Atchison, Kan., and in October, 1914, he went with the Kansas City Southern at Shreveport, La., serving in the valuation department. He entered the service of the Katy on April 26, 1915, as a rodman at Parsons and later served as instrumentman and assistant engineer at that point. In March, 1921, he was appointed accounting engineer at Parsons, and in April, 1921, he was promoted to roadmaster on the Holden division, later serving in that capacity on the Oklahoma and Shawnee divisions. Mr. Underwood was appointed bridge and building supervisor of the McAlester district in September, 1923, and two months later he was appointed roadmaster on the Stamford division. From February, 1924, to February, 1932, he served at various points as instrumentman in the maintenance of way department, assistant engineer on construction work and as roadmaster on the Joplin division. On the latter date, he was appointed roadmaster-switch inspector in the office of the vice-president and general manager at Dallas, Tex., and in July, 1934, he was appointed acting roadmaster between Parsons and Sedalia, Mo. He was promoted to roadmaster on the Sedalia division, with headquarters at Parsons, in November, 1934, and remained in that position, except for a short pe-

riod in 1937, when he was appointed assistant engineer on construction work, until his recent promotion.

**Roy William Putnam,** whose promotion to division engineer of the Rio Grande division of the Southern Pacific, with headquarters at El Paso, Tex., was announced in the November issue of *Railway Engineering and Maintenance*, was born at Buffalo Gap, S.D., on March 23, 1888,

**Roy William Putnam**

and attended South Dakota State Normal College and Colorado College, graduating in civil engineering from the latter in 1912. He entered railway service with the Southern Pacific on August 1, 1912, as an axman on construction at Eugene, Ore., and a year later he was promoted to instrumentman. In 1917, he was transferred to the maintenance of way department of the San Joaquin division at Bakersfield, Cal., and in 1919, he was promoted to assistant engineer of the Portland division, with headquarters at Portland, Ore. In 1922, Mr. Putnam was appointed general foreman in the maintenance of way department of the Portland division. In October, 1925, he was appointed assistant engineer in charge of the construction of the yard and treating plant at Eugene, and in June, 1926, he was promoted to roadmaster at that point. Mr. Putnam was transferred to Oakridge, Ore., in October, 1928, and in November, 1937, he was promoted to assistant division engineer, with headquarters at Portland, the position he held until his recent promotion, effective November 1.

**H. E. Woodburn,** assistant division engineer of the Peoria & Eastern, with headquarters at Indianapolis, Ind., has been promoted to division engineer of the Illinois division of the New York Central (Big Four), with headquarters at Mattoon, Ill., relieving **Frank G. Smith,** who has been transferred to Buffalo, N.Y., replacing **Harry I. Hoag,** whose death on November 3 is announced elsewhere in these columns. **Byram S. Dickerson,** assistant engineer on the Indiana division has been promoted to division engineer of the Peoria & Eastern, with headquarters as before at Indianapolis, succeeding to the duties of Mr. Woodburn. **W. W. Rohrbough,** assistant engineer on the Ohio division (Big Four), at Springfield, Ohio, has been transferred to Indianapolis, replacing Mr. Dickerson and **N. E. Manville,** supervisor of bridges and buildings of the Peoria & Eastern, with headquarters at Indianapolis, has been appointed assistant engineer on the Ohio division relieving Mr. Rohrbough. **L. W. Moss,** assistant engineer on the Illinois division at Mattoon, Ill., has been transferred to the Indiana division at Indianapolis, succeeding **E. H. Looker,** whose appointment as supervisor of bridges and buildings of the Peoria & Eastern is announced elsewhere in these columns.

Mr. Dickerson was born at Galion, Ohio, on September 7, 1887, and graduated from Ohio Northern University in 1909. He entered railway service on March 7, 1912, in the engineering department of the Big Four, and has served that road continuously since that time. During the first World War, he served overseas as a captain in the Coast Artillery corps. Mr. Dickerson has served as an assistant engineer on all of the divisions of the Big Four at various times and also as an assistant division engineer on several divisions. His promotion to division engineer was effective on November 16.

**S. E. Armstrong,** engineer of standards of the New York Central System, has been promoted to engineer maintenance of way-system, with headquarters as before at New York. Mr. Armstrong succeeds to the duties of the late **John V. Neubert,** chief engineer maintenance of way of the system, who died on June 4, 1940. **Charles H. Morse,** office engineer in Mr. Neubert's office, has been promoted to assistant engineer maintenance of way-system, with headquarters also at New York.

Mr. Armstrong was born at Somerville, Mass., and received his education in the public schools of that city and at the

**S. E. Armstrong**

Massachusetts Institute of Technology, Boston, Mass. He entered railroad service with the New York Central in January, 1904, as a chainman at Buffalo, N.Y., being appointed assistant supervisor of track at Rochester, N.Y., in March, 1905. In August of the following year, Mr. Armstrong became assistant engineer at Buffalo, being transferred to Rochester in December, 1908. He was appointed assistant supervisor of track at the same point in 1911, and in 1913 he became acting supervisor of track at the same point, being promoted to supervisor of track at Richland, N.Y., in 1914. Three years later Mr. Armstrong was promoted to division engineer of the Ontario division at Oswego, N.Y., being transferred to the Pennsylvania division, with headquarters at Jersey Shore, Pa., in 1920, and thence to the River division, at Weehawken, N.J., in 1926. In September, 1927, he was further advanced to engineer of standards of the New York Central System, with headquarters at New York, which position he was holding at the time of his recent promotion, effective November 1.

Mr. Morse was born on September 14, 1885, at Brandon, Vt., and first entered railway service on August 13, 1902, as a clerk in the office of the superintendent of the New York Central at Watertown, N.Y. Five years later he was transferred to the engineering corps of the maintenance of way department, holding succes-

**Charles H. Morse**

sively the positions of chainman, rodman and transitman at Watertown, until October 23, 1909. On that date he became a draftsman in the office of the engineer maintenance of way at New York, and while holding this position he attended evening classes at Columbia University during the next two years. Mr. Morse was promoted to assistant supervisor of track at Hudson, N.Y., on June 20, 1912, subsequently holding this position at Poughkeepsie, N.Y., and Corning. On September 1, 1920, he was further advanced to supervisor of track at Clearfield, Pa., later holding this position at Kingston, N.Y. On April 16, 1929, he was promoted to general track inspector on the New York Central lines, Buffalo and East, with headquarters at New York, and on March 16, 1933, he was further promoted to assistant engineer in the office of the chief engineer maintenance of way of the system with the same headquarters. Late in 1937, Mr. Morse was appointed office engineer in the same office, which position he held until his recent appointment as assistant engineer maintenance of way-system.

**Charles Edson Adams,** superintendent of the Long Island and the New York Zone of the Pennsylvania, with headquarters at Jamaica, N. Y., has been promoted to chief engineer of these roads, succeeding **Arthur C. Watson,** whose death on September 23 was announced in the October issue. Mr. Adams will assume supervision of all grade crossing elimination work now under way on the Long

Island, as well as direction of new construction work on the New York division of the Pennsylvania. Mr. Adams was born at Kokomo, Ind., and completed his engineering studies at Ohio State University in 1912. He entered railroad service in 1907 during a vacation from school, serving in the operating department of the Pennsylvania. From 1907 to 1908 he was yard clerk and from 1908 to 1920, assistant in the engineer corps, successively on the Richmond, Cincinnati and Akron divisions. Mr. Adams was promoted to supervisor at Akron in 1920 and in October, 1922, he was transferred to the Buffalo division at East Aurora, N. Y., being transferred to the Eastern division at Rochester, Pa., in April, 1926. From 1928 to 1929 he served successively as division engineer of the St. Louis division at Terre Haute, Ind., and of the Philadelphia Terminal division. Mr. Adams served as general agent at Grand Rapids, Mich., from December, 1929 to 1930, and from the latter date until June, 1932, he was superintendent of the Grand Rapids division, being transferred to the Toledo (Ohio) division in June, 1932, and to the Panhandle division at Pittsburgh, Pa., in July, 1933. He was transferred to the Pittsburgh division in February, 1937, and on September 16, 1939, he was appointed superintendent of the Long Island.

**Charles Edson Adams**

## Track

**A. J. Wilson** has been appointed supervisor of maintenance of the Union Railroad, with headquarters at Pittsburgh, Pa.

**John Welshinger,** track supervisor on the Northern Pacific, has been promoted to roadmaster, with headquarters at Pasco, Wash., succeeding **P. E. Anderson,** who has retired.

**Thomas H. Smith,** extra gang foreman on the Evansville division of the Louisville & Nashville, has been promoted to track supervisor, with headquarters at Russellville, Ky.

**D. M. Dunlop,** transitman on the Canadian Pacific at Winnipeg, Man., has been promoted to roadmaster, with headquarters at Reston, Man., succeeding **William Cooper,** who has been transferred to Minnedosa, Man. Mr. Cooper replaces **N. O. Erlandson,** who has been transferred to Virden, Man., relieving **D. A. Livingstone.** Mr. Livingstone has been transferred to Brandon, Man., succeeding **C. H. Johnston,** who has retired.

**T. R. Alexander,** transitman on the Canadian Pacific at Vancouver, B. C., has been promoted to roadmaster, with headquarters at Fernie, B. C., succeeding **J. E. Mercer,** who has been transferred to Vancouver, relieving **J. H. Baker,** who retired on October 31.

**H. E. Herington,** supervisor of track on the Minneapolis & St. Louis at Watertown, S. D., has been transferred to the Cedar Lake shops, Minneapolis, Minn., succeeding **P. Shaw,** who has been transferred to Fort Dodge, Iowa. Mr. Shaw replaces **A. L. Lechner,** who in turn has been transferred to Watertown, relieving Mr. Herington.

**Theodore M. Curtis,** section and extra gang foreman on the Missouri-Kansas-Texas, has been promoted to roadmaster on the Sedalia division, with headquarters at Parsons, Kan., succeeding **Andrew B. Underwood,** whose promotion to district engineer, Southern district, with headquarters at Parsons, is announced elsewhere in these columns.

**G. S. Bradshaw,** relieving roadmaster on the Calgary division of the Canadian Pacific, has been promoted to roadmaster, with headquarters at Consul, Sask., succeeding **G. E. Baines,** who has been transferred to Bassano, Alta., relieving **N. Bassarab.** Mr. Bassarab has been transferred to Gleichen, Alta., replacing **P. Downey,** who has retired because of ill health.

**G. C. Cleveland,** roadmaster on the Panhandle division of the Atchison, Topeka & Santa Fe, with headquarters at Wellington, Kan., has been transferred to the Slaton division, with headquarters at Hamlin, Tex., succeeding **D. C. Cage,** who has been assigned to other duties. **J. E. Emond,** roadmaster on the Pecos division, with headquarters at Clovis, N. M., has been transferred to Wellington, Kan., replacing Mr. Cleveland, and the position of roadmaster at Clovis has been discontinued.

**M. Young, Jr.,** assistant supervisor of track on the Pennsylvania at Jersey City, N. J., has been promoted to supervisor of track, with headquarters at Cadillac, Mich., succeeding **L. W. Hogston,** acting supervisor of track, who has been appointed assistant supervisor of track on the Chicago Terminal division, at Colehour, Ill., a newly created position. **Kenneth Lieber,** assistant on the engineering corps of the Philadelphia terminal, has been promoted to assistant supervisor of track at Columbus, Ohio, also a newly created position.

**Frank A. Tranzow,** superintendent of track of the Grand Trunk Western, with headquarters at Detroit, Mich., retired on October 31. Mr. Tranzow entered the service of the Chicago & Grand Trunk (now part of the Grand Trunk Western) in October, 1899, as a section laborer at Port Huron, Mich., and was promoted to roadmaster, with headquarters at Durand, Mich., on March 1, 1903. On January 1, 1914, his title was changed to supervisor of track and on August 1, 1928, he was advanced to superintendent of track, with headquarters at Detroit.

**Jack T. Stotler,** roadmaster on the Northern Pacific, with headquarters at Lester, Wash., has been promoted to division roadmaster, with headquarters at Spokane, Wash., succeeding **William A. Bracken,** whose promotion to trainmaster-roadmaster, with headquarters at Missoula, Mont., is announced elsewhere in these columns. **Mathias L. Frederick,** branch line roadmaster, with headquarters at Centralia, Wash., has been advanced to main line roadmaster at Lester, replacing Mr. Stotler and **Otis C. Ferrell,** track supervisor, has been promoted to acting roadmaster at Centralia, relieving Mr. Frederick.

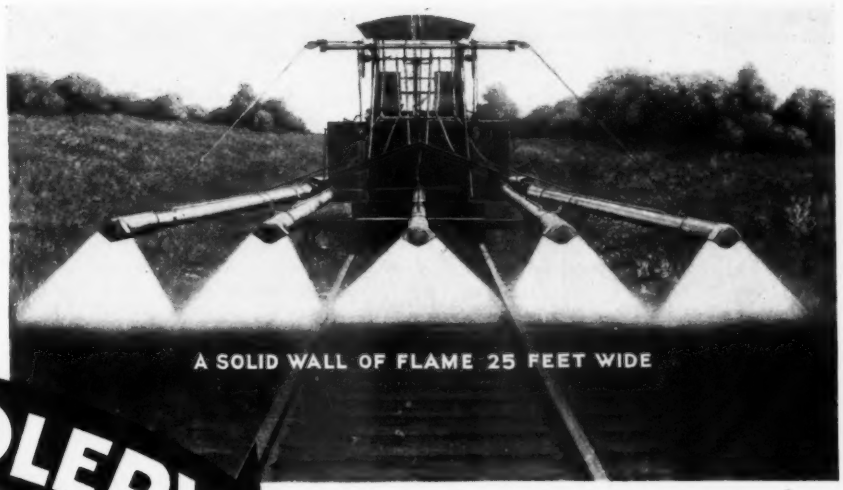
**Henry J. Hawkins,** whose promotion to track supervisor on the Illinois Central, with headquarters at Carbondale, Ill., was announced in the October issue, was born at Makanda, Ill., on January 2, 1901, and entered railway service on March 16, 1914, as a water boy on the Illinois Central. On October 1, 1916, he became a section laborer and on July 1, 1922, he was promoted to section foreman. Mr. Hawkins was advanced to extra gang foreman on May 1, 1927, and continued as an extra gang foreman or section foreman until his recent promotion. All of his service has been on the St. Louis division of the Illinois Central.

**Volney Barton Simpson,** roadmaster on the Chicago, Rock Island & Pacific, with headquarters at Eldon, Mo., has retired. Mr. Simpson was born in Cole county, Mo., on September 16, 1874, and entered railway service in 1889, with the maintenance department of the Missouri Pacific. In 1903, he went with the Chicago, Rock Island & Pacific as a construction foreman at Barnett, Mo., on the line being built from Kansas City, Mo., to St. Louis. Upon the completion of this construction, Mr. Simpson was appointed section foreman, and in 1909, he was advanced to roadmaster, with headquarters at Eldon, the position he held until his retirement.

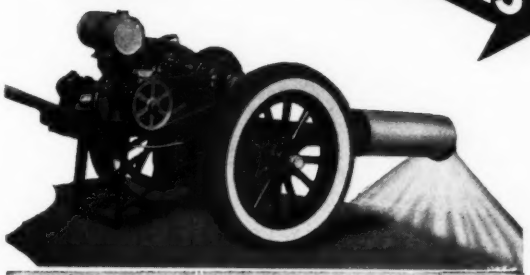
**R. E. Schuett,** whose promotion to roadmaster on the Northern Pacific, with headquarters at Jamestown, N.D., was announced in the October issue, was born at St. Paul, Minn., on April 26, 1913, and graduated in civil engineering from the University of Minnesota in 1934. He entered railway service on May 20, 1935, as a draftsman in the bridge department of the Northern Pacific at St. Paul, and in July, 1936, went with the Minneapolis, St. Paul & Sault Ste. Marie (Soo Line) as a draftsman in the bridge department at Minneapolis, Minn. He returned to his former position with the Northern Pacific six months later, and on February 21, 1938, he was appointed a track apprentice in the maintenance of way department. Mr. Schuett was promoted to acting assistant roadmaster in the Twin City terminals on April 1, 1939, returning to the rank of track apprentice several weeks later. On November 1, 1939, he was advanced to assistant bridge and building supervisor, with headquarters at Glendive, Mont., the position he held at the time of his recent promotion, effective September 15.

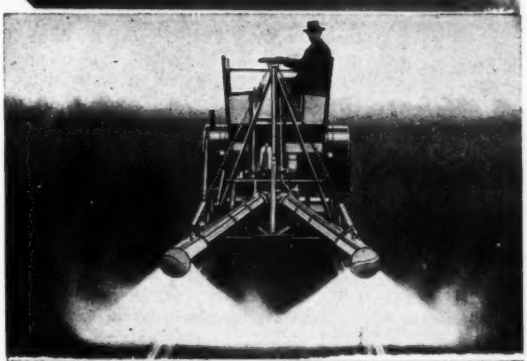
(*Continued on Page 850*)

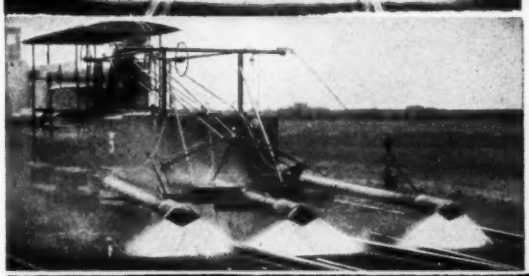
# *For Added* ECONOMY in *1941* INCLUDE WOOLERY WEED BURNERS IN YOUR BUDGET



A SOLID WALL OF FLAME 25 FEET WIDE







The most economical method of destroying weeds is to *burn them*—and the *open flame* principle, as used by Woolery, provides superior results. Its efficiency has been shown in official studies of weed eradication, such as have been conducted in the State of Wyoming since 1937.

There's a type of Woolery Weed Burner for every job. The GIANT OCTOPUS 5-burner spreads a solid wall of flame 25 ft. wide. The two outside burners are under individual control and may be swung out to a width of 35 ft. for burning ditches, slopes, etc.

The GIANT OCTOPUS 3-burner spreads a solid wall of flame 15 ft. wide. Like the 5-burner, the two outside burners may be swung to a width of 25 ft.

The MIDGET OCTOPUS 2-burner is ideal for short or branch line roads and around terminals, and spreads a solid wall of flame 10 ft. wide—or 18 ft. with arms extended.

The new JUNIOR 1-burner model is a portable machine—easily handled by one man—for off-track work around buildings, yards, etc. The JUNIOR will be equally efficient this winter in melting snow and ice from switches, culverts, drainage pipes, etc.

The world-wide reputation of WOOLERY WEED BURNERS is your ASSURANCE that they *should* be in your budget. Write for information.

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RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS

**Harvey W. Johnstone,** whose promotion to roadmaster on the Northern Pacific, with headquarters at Fargo, N. D., was announced in the November issue, was born at Thief River Falls, Minn., on December 23, 1912, and graduated from the University of Montana in 1935. He entered railway service on May 1, 1937, as an extra gang timekeeper on the Yellowstone division of the Northern Pacific. He later worked as a section laborer and on various clerical jobs until February 21, 1938, when he was appointed track apprentice at Duluth, Minn. Mr. Johnstone was advanced to assistant bridge and building supervisor at Glendive on September 15, 1940. His promotion to roadmaster was effective October 1.

**Paul Raymond Gibson,** whose promotion to division roadmaster on the Northern Pacific, with headquarters at Minneapolis, Minn., was announced in the October issue, was born at St. Paul, Minn., on February 5, 1892, and entered railway service in 1910 as a chainman on the St. Paul division of the Northern Pacific, later being promoted successively to rodman, instrumentman and inspector on that division. From 1923 to 1927, he served as resident engineer on various construction projects. In 1927, he went with the Connolly Contracting Company on highway construction work, but returned to the Northern Pacific a year later as assistant engineer on flood control work in the Bad Lands of North Dakota, later serving in the engineering department at St. Paul. In 1933, he was appointed assistant engineer on the location survey for the line from Coulee, Wash., to Grand Coulee Dam. In 1934, Mr. Gibson was promoted to roadmaster at Staples, Minn., and in 1935, he was transferred to Minneapolis, where he was located at the time of his recent promotion.

**John M. Kirschner,** who has been appointed supervisor of track on the Pennsylvania, with headquarters at Williamsport, Pa., as announced in the October issue, was born on August 16, 1914, at Cincinnati, Ohio. Mr. Kirschner obtained his higher education at the University of Cincinnati, graduating in 1934 with a civil engineering degree. He entered railway service on October 16, 1935, as an engineering apprentice on the St. Louis division of the Pennsylvania, with headquarters at Terre Haute, Ind., later serving as an assistant on the engineering corps at several locations. On March 10, 1937, Mr. Kirschner was promoted to assistant supervisor of track on the Columbus division at Columbus, Ohio, returning to the position of assistant on the engineering corps, with the same headquarters, on May 1, 1938. On January 16 of the following year he again assumed the position of assistant supervisor of track, this time on the Pittsburgh division, with headquarters at Derry, Pa.

**Lisle E. McCarl,** whose promotion to supervisor of track on the Conemaugh division of the Pennsylvania, with headquarters at Aspinwall (Pittsburgh) Pa., was announced in the October issue, was born at Altoona, Pa., on November 13, 1910, and graduated from Gettysburg college in 1932. He entered railway service with the Pennsylvania as a chainman, serving in this capacity on the Philadelphia division during the summers of 1929 and 1930. He returned to the service of this company in February, 1934, as an iron worker on the electrification of the line between Baltimore, Md., and Washington, D.C. In September of the following year he became an engineering apprentice on the Philadelphia Terminal division and from March, 1936 to March, 1937, he served as an assistant on the engineering corps at various locations. At the end of this period, Mr. McCarl was promoted to assistant supervisor of track on the St. Louis division at Greenville, Ill., returning to the position of assistant on the engineering corps in May, 1938. In January, 1939, he was again appointed assistant supervisor of track, serving in this capacity on the Maryland division at Baltimore and on the New York division at New York. He was located at the latter point at the time of his recent promotion to supervisor of track.

## Bridge and Building

**W. E. Bickel,** engineer of water service of the Denver & Rio Grande Western, with headquarters at Denver, Colo., has been promoted to assistant master carpenter, with headquarters at Grand Junction, Colo.

**G. E. Martin,** water works supervisor on the Kentucky division of the Illinois Central, has been promoted to supervisor of bridges and buildings, with headquarters at Paducah, Ky., replacing **T. E. Downard,** whose death on October 15 was announced in the November issue.

**Oscar Gran** has been appointed assistant master carpenter of the Minot division of the Great Northern, with headquarters at Minot, N.D., succeeding **Lloyd LaFountaine,** whose promotion to district roadmaster, with headquarters at Berthold, N.D., is announced elsewhere in these columns.

**Emerson H. Looker,** assistant engineer on the Indiana division of the New York Central (Big Four), with headquarters at Indianapolis, Ind., has been appointed supervisor of bridges and buildings of the Peoria & Eastern, with headquarters at Urbana, Ill., succeeding **N. E. Manville,** whose appointment as assistant engineer on the Ohio division of the New York Central (Big Four), with headquarters at Springfield, Ohio, is announced elsewhere in these columns. Mr. Looker was born at Sidney, Ohio, on April 6, 1893, and graduated in civil engineering from Ohio Northern University in 1914. He entered railway service on October 15, 1916, as an assistant engineer on the Big Four at Galion, Ohio, and has served continuously in the engineering department of that road at various points.

**I. Vosburgh,** whose promotion to supervisor of bridges and buildings on the New York Central, with headquarters at Beacon, N.Y., was announced in the November issue, was born on March 3, 1885, at Canajoharie, N.Y., and entered railway service with the New York Central in 1900 as a laborer in the motive power department. On March 3, 1905, he became a carpenter on the Mohawk division and during ensuing years he served in this capacity and as a bridgeman, mason and bridge and building inspector. On September 1, 1922, Mr. Vosburgh was promoted to assistant supervisor of bridges and buildings at Watertown, N.Y., being transferred to Utica on August 1, 1925. Four years later he was appointed general bridge inspector, returning to Utica as assistant supervisor of bridges and buildings on October 20, 1931. He was holding this position at the time of his recent promotion to supervisor of bridges and buildings.

## Obituary

**Harry Frazier,** consulting engineer and former chief engineer of the Chesapeake & Ohio, died on October 4 at his home in Lewisburg, W. Va., after an illness of 18 months, at the age of 79. Mr. Frazier retired in 1930.

**Olaf Martin Rognan,** architect of the Northern Pacific, with headquarters at St. Paul, Minn., died at the Northern Pacific hospital in that city on November 1. Mr. Rognan was born in Norway in July, 1883, and entered railway service in the engineering department of the Northern Pacific in September, 1906. On July 1, 1914, he left railway service to engage in private practice, but returned to the Northern Pacific on May 1, 1917, as architect, the position he held until ill health forced him to relinquish his duties a short time before his death.

**Harry I. Hoag,** division engineer on the New York Central, with headquarters at Buffalo, N.Y., died of a heart attack on November 3 at the age of 58 years. Mr. Hoag was born at Albany, N.Y., on December 4, 1880, and entered railway service with the New York Central in 1903, as a chainman in the maintenance of way department of the Mohawk division. After serving as a rodman, draftsman and assistant supervisor of track, he was promoted to general supervisor of track, with headquarters at New York, in 1916. In 1929, Mr. Hoag was further advanced to division engineer, with headquarters at Rochester, N.Y., being transferred to Jersey Shore, Pa., in 1903 and then to Buffalo in 1935.

**George Monroe Luther,** district engineer, Southern district, of the Missouri-Kansas-Texas, with headquarters at Parsons, Kan., died suddenly of a heart attack at his hotel in Parsons on August 2. Mr. Luther was born at Girard, Pa., on June 5, 1889, and graduated from Ohio Northern University in 1914. He entered railway service on January 10, 1916, as a rodman on the Katy at Parsons and in August, 1916, he was promoted to instrumentman at that point, later being transferred to Muskogee, Okla. In May, 1918, he joined the U. S. Army Engineers and saw service in France. He returned to the Katy as an instrumentman at Muskogee in June, 1919, and in March, 1921, he was transferred to the office of the engineer of maintenance of way at Parsons. Mr. Luther was promoted to roadmaster, with headquarters at Wichita

*(Continued on Page 852)*

# WOODINGS-VERONA TOOL WORKS

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To our Friends
and Patrons a
Very Happy
New Year

# WOODINGS FORGE & TOOL CO.
VERONA, PA.

Falls, Tex., in November, 1926, and in March, 1929, he was appointed assistant engineer in the office of the engineer of maintenance of way at Dallas Tex. In August, 1931, that position was abolished, and he was reappointed roadmaster at Wichita Falls. On December 1, 1939, he was promoted to district engineer, Southern district, with headquarters at Parsons.

**William Benson Storey,** former chief engineer and president of the Atchison, Topeka & Santa Fe, whose death at Chicago on October 24, was announced in the November issue, was born in San Francisco, Cal., on November 17, 1857, and graduated from the University of California in 1881. He first entered railway service during summer vacations as an axman on the Central Pacific (now part of the Southern Pacific) and after graduation he became a rodman on a reconnaissance survey made by the Central Pacific, looking for a possible route

**William Benson Storey**

from Utah to Oregon. He subsequently served as an instrumentman on construction and in 1883, he was promoted to assistant engineer on construction. In 1884, he and another engineer opened an office in San Francisco and engaged in private practice. Two years later, after building two short lines of railroad in California, the partnership was dissolved and Mr. Storey went with the Southern Pacific as engineer in charge of the location and construction of a short line of railroad in the San Joaquin valley. In 1894, he became assistant engineer on the California Debris Commission and in 1895, he became chief engineer of the San Francisco & San Joaquin Valley, which was organized to build a railroad from San Francisco to the San Joaquin valley. In 1900, when this road became part of the Santa Fe, Mr. Storey was made chief engineer of the Eastern lines of the Santa Fe. In July, 1906, he was promoted to chief engineer of the system, with headquarters at Chicago, and in 1909, he was elected vice-president in charge of construction. A year later he was also given jurisdiction over the operating department. In the latter part of 1917, he was appointed federal manager and on January 1, 1920, he returned to the corporate organization as president. On May 2, 1933, Mr. Storey retired from the presidency, but continued as a member of the board and of the executive committee.

# Supply Trade News

## General

**Marvel Equipment Corporation,** Chicago, has moved its sales office from its factory to 224 South Michigan Avenue, Chicago.

**C. D. Hicks Company,** St. Louis, Mo., has been appointed sales agents in the St. Louis area for the arc welding equipment, accessories and electrodes manufactured by the **Universal Power Corporation,** Cleveland, Ohio.

## Personal

**G. W. Curtis** has been appointed Milwaukee division manager of the **Timken Roller Bearing Company,** Canton, Ohio.

**William M. Leighton,** who has represented **The Oxweld Railroad Service Company** in the Southeastern territory for the past several years, will retire on December 31, 1940.

**Henry H. Timken, Jr.,** vice-president and general manager of the steel and tube division of the **Timken Roller Bearing Company,** Canton, Ohio, has also been elected chairman of the board to succeed his father, **Henry H. Timken, Sr.,** whose death on October 14, was announced in the November issue.

**Earl G. Morgan,** formerly a district representative of the Vilter Manufacturing Company, has joined the air conditioning and refrigeration division of the **Worthington Pump & Machinery Corporation** as sales representative with headquarters at the company's Kansas City, Mo., office.

**W. M. Black,** vice-president of the American Manganese Steel division of the **American Brake Shoe & Foundry Co.,** with headquarters at Chicago Heights,

**W. M. Black**

Ill., has been elected president with the same headquarters. **W. E. Crocombe,** who formerly headed this division, continues as president of the American Forge division. Mr. Black has been with American Manganese since 1912, with the exception of the war years when he served as a lieutenant in the ordnance department of the United States army. He was appointed general sales manager in 1934 and was elected vice-president in 1935.

## Trade Publications

**Flame Hardening Apparatus.**—A 12-page bulletin has been published by the Air Reduction Company, New York, describing specifically the Airco Style 4383 water-cooled flame-hardening torch and the variety of extensions and tips available for use with it. The bulletin also describes special equipment such as torch holders, adjustable arms and the Airco No. 4 Radiagraph.

**Coefficients for Wood Trusses.**—A 48-page bulletin, entitled Wood Trusses-Stress Coefficients, Length Coefficients and Angles, has been published by the National Lumber Manufacturers Association, to provide a conveniently arranged compilation of such data for wood structural design. The bulletin presents the data for many types of trusses, which are shown by drawings opposite the tables of coefficients and angles for each.

**Simplex Jacks Junior Catalog**—A new vest pocket size, 60-page Junior Catalog, designated as No. 40, has been published by Templeton, Kenly & Company, Chicago, which fully describes the construction, applications and specifications of the more than 300 sizes and types of Simplex jacks. The catalog contains over 100 illustrations and describes the Simplex automatic raising and lowering jacks, screw jacks, journal jacks, geared jacks and the more specialized jacks for various other industries.

**Fairbanks-Morse Pumps.**—Fairbanks, Morse & Company, Chicago, has published two new bulletins 5710 and 6930 R., the first of which, in 16 pages, describes the line of Angleflow pumps in both vertical and horizontal types, which are adapted to large capacity pumping in the lower head range. This bulletin is attractively printed in color and well illustrated with photographs of pumps, pump installations and cut-away views showing the construction details. Bulletin 6930 R is a revised form of the bulletin describing the construction features of the Fairbanks-Morse Fig. 6930 water-lubricated turbine pumps with open impellers.

**Rail Defect Manual**—Sperry Rail Service, Hoboken, N.J., has issued a second edition of its Rail Defect Manual which was originally published in 1934. This is a pocket-size publication, bound in loose-leaf form with flexible leatherette covers, which illustrates by means of photographs and drawings the various types of rail defects, and in each case it explains briefly the manner of occurrence and importance of the defect, its cause and how it progresses, and how to identify it before and after the rail has broken. Except that the color of the covers has been changed from blue to brown and that four new pages have been added, the new edition of the manual is identical with the original. Copies of the four new pages are being furnished without charge to holders of the first edition. The cost of the complete new edition is 40 cents per copy for delivery in the United States and 50 cents per copy for foreign delivery.

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# TO RAILWAY SUPPLY MANUFACTURERS

## *"While Others Sleep"*

"Bill, I suppose you heard about that big defense order the government divided between our company and the X . . . . . Company last week."

"Yes, Boss. The boys told me about it when I came in from that southern trip last Saturday. They say it'll keep the plant busy for several months."

"That's what I understand."

"I suppose, then, that I can stay in off the road for a while. I'm certainly ready for it. I've been pounding the pavement for ten years without a let-up, chasing such business as was available."

"You've certainly done a fine job, Bill. You've gotten more than our share. But you're going to have to continue that work. This government order creates new problems for you and me. We've got to keep in closer touch with our railway friends than ever before."

"I don't see why—we've got nothing to sell them now and we don't need their business."

"That's where you're dead wrong, Bill. We *do* need their business after this war's over. And if we're going to have it then, we've got to help tide them over until we're in production again."

"But that won't take much of my time."

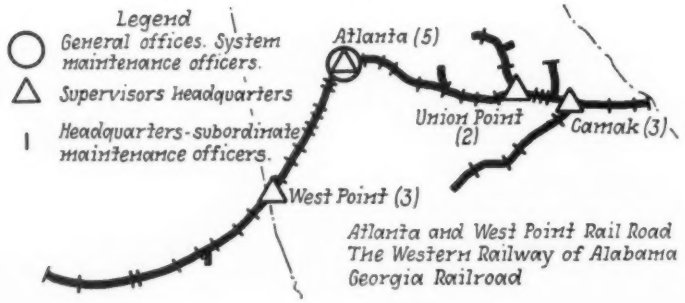
"That's right. But don't forget that there are other roads whose business we've never had but would like. You have a chance now to meet these men and tell them our story when the X . . . . . Company's out of production too. Now's the time to lay the foundation for even larger business when the war's over. We can't afford to let our present customers forget us and perhaps we can pick up some new ones from the X . . . . . Company while 'its men are asleep'."

"That sounds reasonable, Boss. I can see where you're right. And how about our advertising in *Railway Engineering and Maintenance?*"

"We're going to continue it, of course. It's another way of preventing our friends from forgetting us and our products. And it goes into lots of offices we never get into."

"That's right, Boss. I found that out last week when I was down on the Atlantic & West Point, Western of Alabama, Georgia railways. Why, that magazine has 62 subscribers on these 450 miles of lines. It goes everywhere—and those men read it from cover to cover, advertisements and all. Why, they know almost as much about our materials as I do, from the fine copy you've been running in our advertising."

"I'm glad to hear that, Bill. That's the kind of a magazine we need in these days."

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**Railway Engineering and Maintenance** Goes Every Month to the **Chief Engineer** and the **4 Supervisors of Track** on the Atlanta & West Point, the Western Railway of Alabama and the Georgia Railways. This Magazine Also Goes to 57 Other Subordinate Maintenance Officers Who Are in Training for Promotion to Supervisory Positions on These Railways.

★

**RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS**

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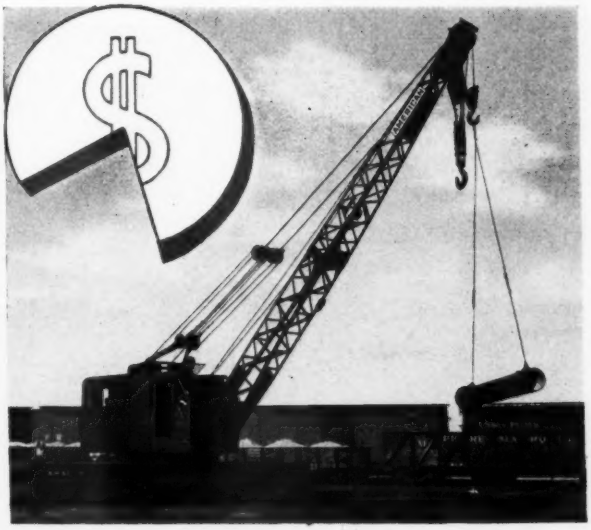
## SYNTRON "OFF-THE-TRACK" GAS-ELECTRIC PLANT

**CUT YOUR LABOR COST OF SURFACING TRACK FROM 20% TO 30%**

Tamp your track quicker—more uniformly—at lower cost per mile—with the time-proved **Syntron** method. 2, 4, 6 or 8 Tool Outfits are available. Put them on the job and note the savings for yourself.

**SYNTRON CO.**
**Homer City, Pa.**



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Model 825 .....25 ton
Model 830 .....30 ton
Model 408 .....40 ton
Model 508 .....50 ton

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the NEW DUFF-NORTON TIE-PULLER

## Cuts Tie-Replacement Labor Cost in HALF!

Thorough tests under normal track maintenance conditions show that, when the New Duff-Norton Tie-Puller is used, tie replacement jobs are completed in half the time ordinarily required!

With this handy tool, ties are removed and replaced easier and faster—but that is only part of the story. It is easy to use, sturdy and dependable. There is less disturbance to the roadbed, less spotting and tamping. Use the Duff-Norton Tie-Puller to make your Maintenance of Way Budget go farther!

*Send for* bulletin giving full information about the Duff-Norton Tie-Puller, or write for a sample to try out on your road.

**THE DUFF-NORTON MANUFACTURING COMPANY**
**PITTSBURGH, PA.**

We want to cut our maintenance costs, and
☐ We would be interested in testing a Duff-Norton Tie-Puller
☐ Please send Leaflet describing Duff-Norton Tie-Puller

Name..... Position.....

Company.....

Address.....

# MORE POWER

## in less size . . . . . .

No giant in size, but for sheer performance in doing numerous railroad jobs where power and economical operation mean the difference between all-year-round utility and unprofitable storage, Burro Cranes have no equal.

Burro Cranes are *designed* to accomplish more. They have less height, less tail swing, less weight to maneuver—yet all the needed power to lift, pull and travel.

Top picture shows a Burro in yard work with insulated boom and below as a work train unit.

● Write today for circular with specifications.

BURRO CRANES

CULLEN FRIESTEDT CO.

**CULLEN-FRIESTEDT CO.,**
1301 S. KILBOURN AVE. CHICAGO, ILLINOIS

# LUNDIE
## TIE PLATES

## *ASSURE MAXIMUM LIFE TO TIES*

ONE of the objects gained by Lundie Tie Plates is the even distribution of loads over the entire surface of the plate and consequent reduction of tie cutting. The corrugated base of the Lundie Tie Plate prevents sliding and is designed to bring the wheel loads at right angles to the multiple bearing surfaces on the tie. This assures maximum life and minimum track maintenance.

**The LUNDIE Stepped, Non-Cutting, Non-Slip Base . . .**

## THE LUNDIE ENGINEERING CORPORATION

*Tie Plates—Spring Rail Clips—Safety Tongs for Handling Track Material—Aladdin Rail and Flange Lubricator*

**19 WEST 50th ST., NEW YORK** **59 E. VAN BUREN ST., CHICAGO**

## NEW, COST-CUTTING, ACCIDENT-REDUCING
# *Claw Bar*

Two men with Flex-Toe Claw Bars can pull as many or more spikes per day than three men with conventional bars. This new claw bar will remove headless spikes and throat-cut spikes—in short, it gets everything.

There's nothing new to learn. The Flex-Toe is thrown on a spike in the usual way. The toes grab hold of any piece of protruding metal the instant the handle is pulled. Driving with the spike maul is largely eliminated. It will be the fastest and safest claw bar you ever had on your track. Write today for descriptive literature.

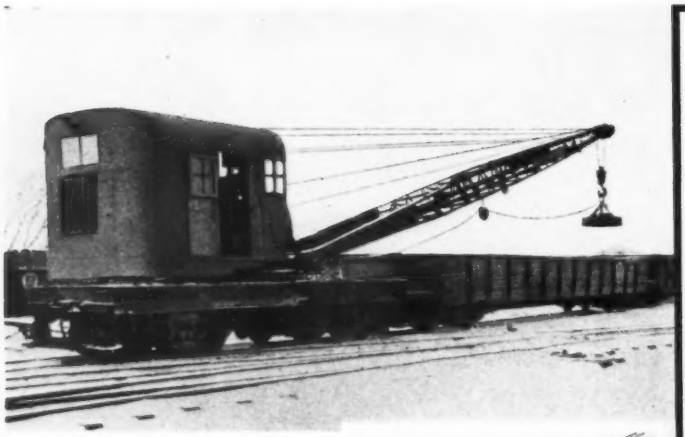
**1** The Flex-Toe Bar with open toes is easily thrown on the spike, biting beneath the head or anywhere along the shaft.

**2** Leverage on the handle closes the toes automatically, gripping tightly both sides of spike.

**3** Powerful leverage . . . acting on a short fulcrum . . . puts full force of muscular strength into the pull.

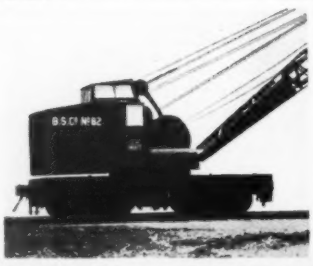
**4** Repeated bites may be taken along the shaft of the spike to pull it straight out.

## WARREN TOOL CORP.
WARREN, OHIO



**MONITOR-TYPE CAB**

Industrial Brownhoist Monitor-type Cab cranes are the only Diesel machines which provide 100% visibility . . . increased safety . . . and greater comfort for their operators. This exclusive cab design permits faster operating speeds and, therefore, increases output.



# INDUSTRIAL BROWNHOIST

GENERAL OFFICES: BAY CITY, MICHIGAN

DISTRICT OFFICES

New York, Philadelphia, Pittsburgh, Cleveland, Chicago.

# 710,175 TONS OF PIGS!

**Though not yet five years old, a 25-ton Industrial Brownhoist Diesel crane owned by a large steel mill has already worked a total of 12,877 hours, with "time out" of only 174½ hours.**

**During its lifetime, this crane has consumed 23,999 gallons of fuel oil, an average of 1.88 gallons per hour. It has loaded, unloaded and transferred 710,175 tons of pig iron; switched loaded cars containing a total of 39,623 tons and has handled up to 1,500 tons in an 8-hour shift.**

**Your near-by Industrial Brownhoist sales representative has plenty of facts and figures on Industrial Brownhoist Diesels doing work similar to yours. Ask to see them and make your own comparison with your present handling costs.**

* Cut Power Costs
* Cut Labor Costs
* Cut Production Time
* Less Operator Fatigue
* Power Available in Any Position

MALL 5 H.P. portable rail grinders quickly demonstrate these major money saving advantages on all rail grinding work. Interchangeable attachments can be furnished for cross grinding, surface grinding, switch point grinding and drilling; also, for pumping, chain and circular sawing.

MALL grinders are powerful, efficient and foolproof. They speed up the work and put rail maintenance on a low cost basis.

Write today for circulars on the MALL 5 H.P. rail grinder, the four wheel rail grinder, and the bridge and building units; also, ask for a demonstration. No cost or obligation!

## MALL TOOL COMPANY

Railroad Department

**7746 South Chicago Avenue** **Chicago, Illinois**

Sales Offices in all Principal Cities

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Unusual Items. . . . Unusually Priced!

1, 6½-yd. Bucyrus 320-B Electric Shovel
168, 20-yd. Magor, Western and Koppel Air Dump Cars
50, 30-yd. Clark Air Dump Cars, D/T Doors
1, 20-yd. 30-ton Electric Dump Car; 550 v. D.C.
12, 50-ton Covered Hopper Cars
100, 50-ton Standard Hopper Cars
100, 50-ton Gondola Cars
100, Tank Cars; or Shells

**All other types of both R.R. and Industrial Cars, too. Car Repair Parts. Full Line. Approx. 50% saving vs. New.**

**1, 30-ton Lima Gasoline Locomotive**
**Locomotives; all types and kinds.**

Cars You Have Been Looking For!

**40 to 50**

Clark G-6, **30-Yard** 50-Ton Air Dump Cars, **down-turning door** type.

Extra heavily constructed.
Floor Plates ½"
Steel Wheels.
Cheaply priced. Act before too late!

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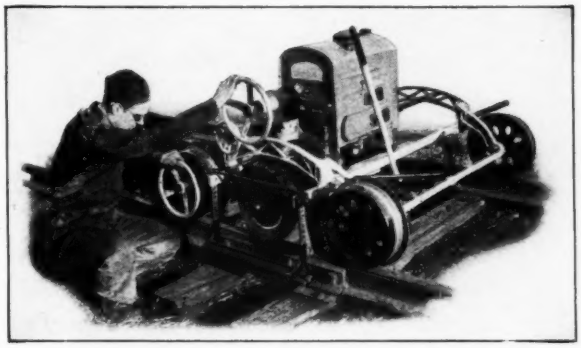
13472 S. Brainard Avenue Chicago, Illinois
**"Anything** containing IRON or STEEL"

## *No R. R. Bottlenecks!*

● America's railroads will help speed the Nation's Defense Program. Rail will keep pace with rolling stock. Rail maintenance will speed up, for only on well-maintained rail can heavy traffic move with speed and safety. Railway Track-work Rail Grinders will speed the work and keep down the cost. There are many models to meet specific conditions. Write for newest data bulletins.



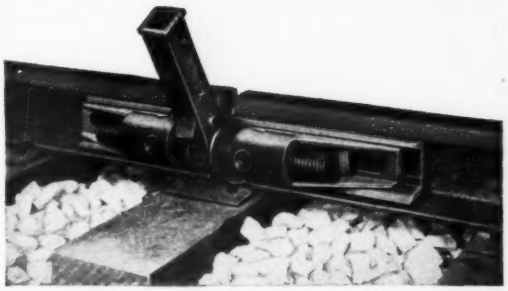
Railway Track-work Model P-6 Track Grinder

**Railway Track-work Co.**

3132-48 East Thompson St., Philadelphia

S71

## 77 RAIL LENGTHS—



—pulled or pushed easily with a Simplex Rail Puller and Expander. It's applied in a few seconds. Few men do the work of a gang. Crossings and switches lined; continuous rail lengths pushed or pulled; insulated joints and end posts renewed with savings in time that quickly defray its cost. A fast, practical, economical tool used by most railroads.

Made by the manufacturers of Simplex Electrided Track Jacks, Simplex Car Retarder Jacks, and the G-Y Tie Spacer.

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*Cutting Maintenance of Way Costs Since 1899*

Representatives in Principal Cities of the World

**SIMPLEX Jacks**

Awarded the Gold Medal for Safety

Send For Simplex Bulletin T & B 37

Available now with the new Chrome Face Line, the "Wolverine" is a better steel tape than ever. The jet black markings are easy to read against the satin-chrome surface that won't rust, crack, chip, or peel. Line ¼ inch wide. See it at your dealers. Write for Free Catalog 12B.

NEW YORK 106 Lafayette St

**THE LUFKIN RULE CO.** SAGINAW, MICHIGAN

Canadian Factory WINDSOR, ONT.

**TAPES — RULES — PRECISION TOOLS**

## ACID and ALKALI RESISTANT DYE for FLOORS

**Imparts Enamel - like Finish in Beautiful Color**

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COLORFLEX is an excellent, colorful preservative for use on wood or concrete floors. Quickly applied with ordinary roof brush or mop. Eliminates painting. Penetrates the pores of the floor . . . won't skin off, check, craze or crack. Raw alcohol has no effect on it. Sulphuric acid won't touch it. It's fire resistant. The gloss stands up under the hardest kind of floor traffic. Over wood, COLORFLEX prevents splintering. Over concrete it prevents dusting. Dries in four hours. Used indoors or out.

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- 4-HOURS DRY
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2347 Manning St., Philadelphia, Pa.
Please send me complete COLORFLEX information . . . details of FREE TRIAL OFFER. No obligation.

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COMPANY _____

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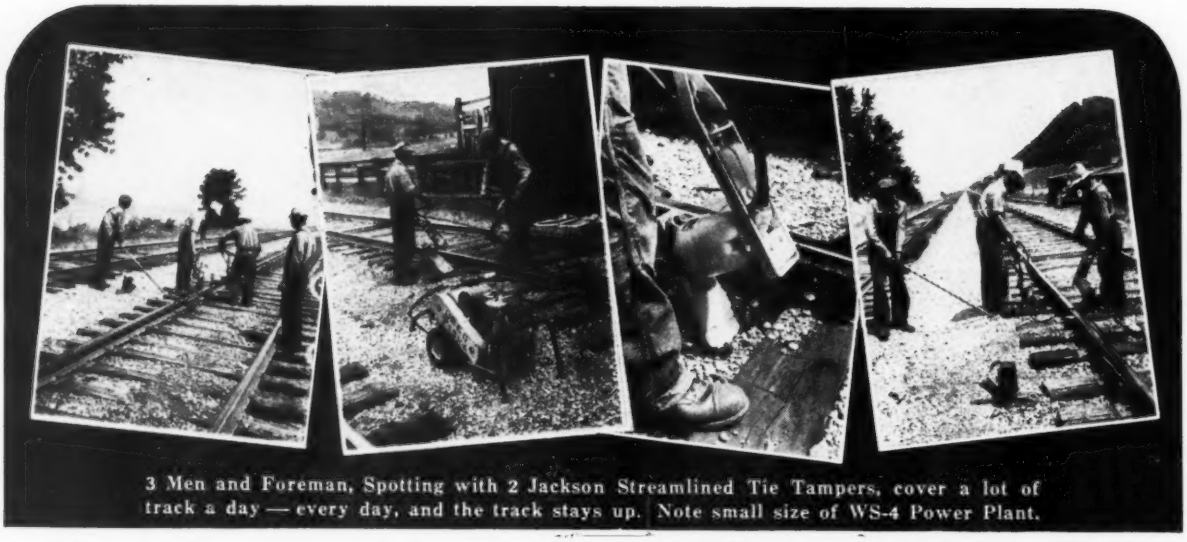
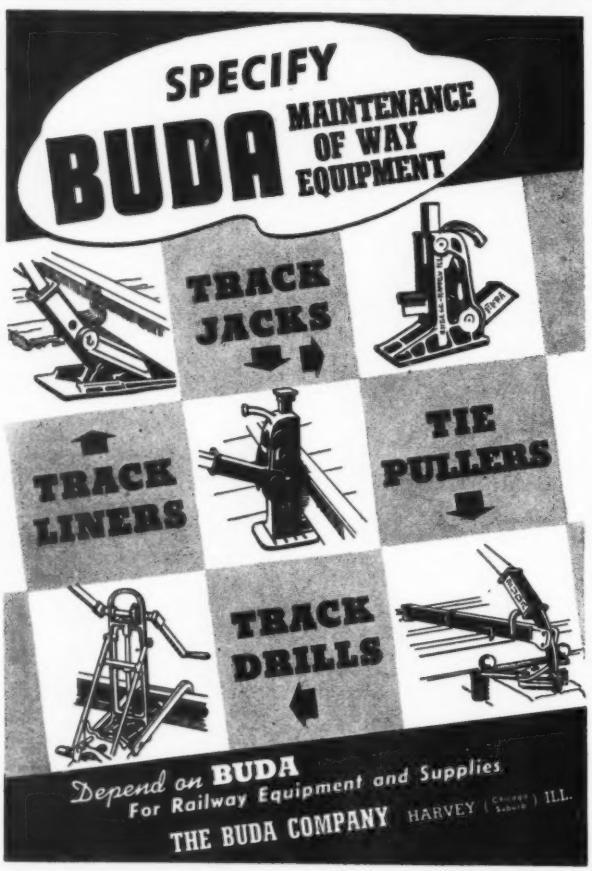


3 Men and Foreman, Spotting with 2 Jackson Streamlined Tie Tampers, cover a lot of track a day — every day, and the track stays up. Note small size of WS-4 Power Plant.

## Small Section Gangs Need EFFICIENT TAMPERS, Too!

**Give them two Dependable Jackson Streamliners and the REALLY Light and Portable WS-4 Power Plant to run them. Add 2 more any time you need them — the small WS-4 Power Plant easily handles 4 Jackson Streamliners. Why gamble? When you buy Jacksons, you get proved performance. We'll be glad to show you.**

**JACKSON** ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

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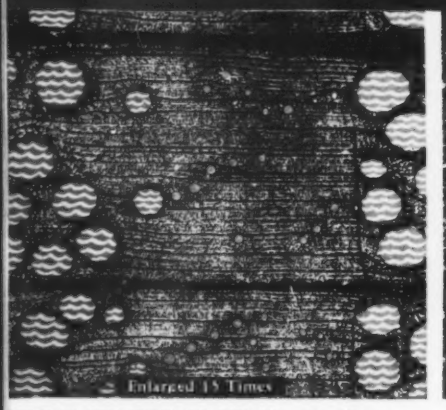
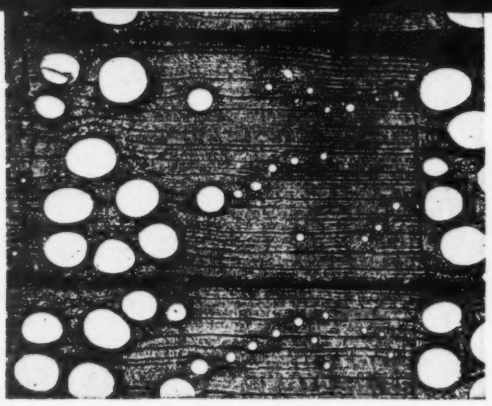
● SERVING RAILROADS FROM COAST TO COAST ●

# PRESSURE-TREATED TIMBER PAYS FOR ITSELF . . .



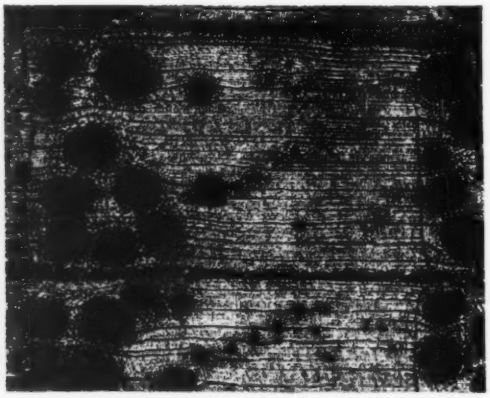

**WATER IN THE FORM OF SAP** fills the fibers and cells in green timber. In a live tree it helps growth; in cut timber it promotes decay. Green timber may contain as much as 25 pounds of water per cubic foot.



**REMOVAL OF MOST OF THE WATER** is the first step in preparing timber for preservative treatment.

**AIR SEASONING** is the best method of c ditioning or drying wood for pres treatment. Ample stocks of W.P.C. timb are dried in ventilated stacks in clean, w drained yards under careful control supervision for future use.

**THE WOOD PRESERVING CORPORATION** is also equipped to condition timber artificially. These methods require expert supervision.



**CREOSOTE IS THEN APPLIED** under pressure and thoroughly penetrates the fibers of the wood. Timber treated in this manner is protected against decay and insect and marine borer attack.

**OTHER USES FOR PRESSURE-TREATED TIMBER**

Tipples . . . Piling . . . Guard Rails . . . Fences . . . Poles . . . Buildings, Bins Sheds . . . Piers . . . Bu Wharves . . . Platforms . . . Flooring . . . Tanks, Se Vats . . . Crossing Plank . . . Barge Sides and Bot . . . Cable Ways . . . Conduit . . . Culverts . . . Flumes . . . Trench Lining and Covers . . . Cons Decking and Supports.

**OTHER KOPPERS PRODUCTS FOR THE RAILWAY FIELD**

Coal . . . Coke . . . Coal Cleaning and Handling Syst . . . General Engineering and Construction . . . Ba . . . Waterproofing . . . Cylinder Packing . . . Ame Hammered Piston Rings . . . D-H-S Bronze . . . Base Paints . . . Weed Killers . . . Car Floats, Fu . . . Tarmac Paving . . . Disinfectants, Insecti

*Ask for Literature on any of these Products*

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